THE MARINE REVIEW

VOL. 48 CLEVELAND AUGUST, 1918 NEW YORK No. 8

Shipbuilders Now Hold Trump Hand

Men Carrying on Government's Vessel Constructing Program Answer Germany's Challenge in Wonderful Fourth of July Launching Record

ADMIRAL JELLICOE could hardly have known four or five months ago how American shipyards would celebrate the Fourth of July. In that respect he was in the same position as the group of German admirals of the Von Tirpitzian ilk who despite the familiar saying are prophets without honor save in their own country.

But the former commander of the British grand fleet has scored again over his rivals. His prediction months ago was that by Aug. 1, the submarine menace would be removed and Germany's illegal campaign would be under control. He meant, and other authorities have subsequently confirmed this impression, that ships would continue to be sacrificed to Teutonic lust, but that as a major factor in the winning or losing of the war, the submarine would by that date be permanently discounted.

What Has Happened in Fifteen Months

The month which witnessed the greatest tonnage sunk by the torpedoes of the Hun also marked the entrance of the United States into the war. The month which, if we may accept the predictions of competent authorities, is to witness the definite dethronement of the submarine from its former post of importance, has already been marked by solid assurance that America's great shipbuilding task is being successfully met.

Repetition of the bare figures alone, furnishes a basis for satisfaction over the progress we have made and will make. Without any unjustified delays in retarding launchings for the mere sake of piling up a record, the Fourth, according to official announcement, was celebrated by American shipbuilders in a way that no other nation ever was able to observe its national holiday. A total of 95 ships, deadweight tonnage 474,464; 42 steel ships of 287,464 tons, and 53 wooden ships of 187,000 tons. That the record is no 24-hour flurry was shown a few days later when officials announced the total ship deliveries in the week ending on the Fourth aggregated 23 ships of 122,771 tons, or 20,462 tons each working day.

The Fourth of July record has been named as a new Declaration of Independence, and the deeper significance of the day gives the phrase body and meaning far beyond a neat figure of speech. Essentially, the wonderful total placed in bold display before the eyes of the world the wide scope of America's aroused industrial force. It shattered what semblance of belief Germany's present leaders may have held in the feebleness of America's l wers—a belief, whether real or feigned, which they l..ve been loudly parading before their present dupes. It gave tangible assurance to our allies that our months of preparation and occasionally loud boasting, were nearing the period of successful and continued accomplishment. It gave to the American people themselves the satisfaction of knowing that the apathy of past years was gone, the exasperating delays of last year were being erased by the wonderful record of the present.

Winning a Place in the Sun

Who can doubt the future of the American merchant marine now that an aroused American public has placed itself back of a shipbuilding program? Primarily a Declaration of Independence against Germany's dark forces of the sea, the Fourth marks also an Ultimatum of Freedom for the new American merchant marine. In stepping to her place in answer to Germany's challenge, the United States has brought to a close the dark days of our maritime decay.

The response of the American shipbuilder will stand out from the pages of the history of this war. Old and new alike, the one who had weathered the days of declining business and the one who entered in the days of an assured market for his wares, deserve the gratitude of a nation for their work. Employer and employe, president and heater boy, are winning a big game in a big way.

The record is set forth at length on the following pages in tables and as caught by the camera. May the "big splash" become a tidal wave.

Generated on 2024-07-26 17:19 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Generated on 2024-07-26 17:19 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

U. S. Shipyards in "Big Splash" Launch New Declaration of Independence

WOODEN VESSELS

EASTERN YARDS

Builder	Name of ship	Type	Tons
Johnson Shipyards, Corp., Mariners Harbor, N. Y.	Aowa	Cargo	3500
The Foundation Co., Kearny, N. J.	Alanthus	Cargo	3500
Groton Iron Works, Noank, Conn.	Daloto	Cargo	3500
Portland Ship Ceiling Co., Portland, Me.	Okesa	Cargo	3500
Kelly-Spear Co., Bath, Me.	Columbine	Cargo	3500
Cumberland Shipbuilding Co., Portland, Me.	Cumberland	Cargo	3500
	Falmouth	Cargo	3500
L. H. Shattuck, Inc., Portsmouth, N. H.	Chibiabos	Cargo	3500
	Milton	Cargo	3500
	Roy H. Beattie	Cargo	3500
Traylor Shipbuilding Co., Cornwells, Pa.	Alapaha	Cargo	3500

GULF YARDS

Tampa Dock Co., Tampa, Fla.	Agria	Cargo	3500
Jahncke Shipbuilding Co., Inc., Madisonville, La.	Bayou Teche	Cargo	3500
Dierks-Blodgett Shipbuilding Co., Pascagoula, Miss.	Belair	Cargo	3500
Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.	Benago	Cargo	3500
Hodge Shipbuilding Co., Inc., Moss Pt., Miss.	Alpaco	Cargo	3500
Dantzler Shipbuilding & Dry Dock Co., Moss Point, Miss.	Boone	Cargo	3500
Mobile Shipbuilding Co., Mobile, Ala.	Baline	Cargo	3500
Southern Dry Dock & Shipbldg. Co., Orange, Tex.	Arenac	Cargo	3500
National Shipbuilding Co., Orange, Tex.	Beechland	Cargo	4700
Universal Shipbuilding Co., Houston, Tex.	Banicaa	Cargo	3500
McBride & Law, Beaumont, Tex.	Quapaw	Cargo	3500
Union Bridge & Construction Co., Morgan City, La.	Amoron	Cargo	3500
Lone Star Shipbuilding Co., Beaumont, Tex.	Arado	Cargo	3500
Midland Bridge Co., Houston, Tex.	Katonah	Cargo	3500
Morey & Thomas, Jacksonville, Fla.	Bedminster	Cargo	3500
Terry Shipbuilding Corp., Savannah, Ga.	Oglethorpe	Cargo	3500

PACIFIC COAST

Fulton Shipbuilding Co., Wilmington, Cal.	Mono	Cargo	3500
Allen Shipbuilding Co., Seattle	Sosworth	Cargo	3500
Grant-Smith-Porter Co., Aberdeen, Wash.	Wihaha	Cargo	3500
Grant-Smith-Porter Co., Portland, Oreg.	Itanca	Cargo	3500
Grays Harbor Motor Ship Corp., Aberdeen, Wash.	Broncho	Cargo	4000
Meacham & Babcock, Salmon Bay, Wash.	Daca	Cargo	3500
Meacham & Babcock, Seattle	Wayucan	Cargo	3500
Nilson & Kelez, Seattle	Forster	Cargo	3500
Pacific American Fisheries, South Bellingham, Wash.	Blythedale	Cargo	3500
Sanderson & Porter, Willapa Harbor, Wash.	Kenosha	Cargo	3500
Seaborn Shipyards Co., Tacoma, Wash.	Chimo	Cargo	3500
Sloan Shipyards Corp., Seattle	Sewickly	Cargo	3500
Tacoma Shipbuilding Co., Tacoma, Wash.	Coloma	Cargo	3500
	Fassett	Cargo	3500
Wright Shipyards, Tacoma, Wash.	Bourneville	Cargo	3500
G. M. Standifer Construction Corp., Portland, Oreg.	Umatilla	Cargo	3500
	Montezuma	Cargo	3500
	Belding	Cargo	3500
	Benzonia	Cargo	3500
	Moosabee	Cargo	3500
	Kangi	Cargo	3500
	Okiya	Cargo	3500
Peninsula Shipbuilding Co., Portland, Oreg.	Braeburn	Cargo	4000
Coast Shipbuilding Co., Portland, Oreg.	Cahesa	Cargo	3500
McEachern Ship Co., Astoria, Oreg.	Benvela	Cargo	3500
	Cotteral	Cargo	3500
Grant-Smith-Porter Co., St. Johns, Oreg.	Necolah	Cargo	3500
Sommarstrom Shipbuilding Co., Columbia City, Oreg.	Wanzu	Cargo	3500
	Maratanza	Cargo	3500
Wilson Shipbuilding Co., Astoria, Oreg.	Benifay	Cargo	3500
Supple & Ballin, Portland, Oreg.	Airlie	Cargo	4000
Geo. F. Rodgers & Co., Astoria, Oreg.	Blue Eagle	Cargo	3500
St. Helens Shipbuilding Co., St. Helens, Oreg.	Colindo	Cargo	3500
Hammond Lumber Co., Humboldt Bay, Cal.	Bloomington	Cargo	3500

STEEL VESSELS

EASTERN YARDS

Builder	Name of ship	Type	Tons
Standard Shipbuilding Corp., Shooters Island, N. Y.	Morristown	Cargo	7,300
Submarine Boat Corp., Newark, N. J.	Alamosa	Cargo	5,500
	Alcona	Cargo	5,500
	Chetopa	Cargo	5,500
The Texas Co., Bath, Me.	Canabia	Cargo	9,500
Wm. Cramp & Sons Ship & Eng. Bldg. Co., Philadelphia	Santa Teresa	Transport	4,986
Pennsylvania Shipbuilding Co., Gloucester, Pa.	Brandywine	Tanker	7,000
	Indianapolis	Cargo	12,500
New York Shipbuilding Corp., Camden, N. J.	Scanlon	Cargo	8,100
Bethlehem Shipbuilding Corp., (Harlan Plant), Wilmington, Del.	(Number 457)	Cargo	3,500
Bethlehem Shipbuilding Co., Elizabethport, N. J.	Garfield	Cargo	3,500
Pusey & Jones, Wilmington, Del.	Aurora	Cargo	4,000
Baltimore Dry Dock & Shipbuilding Co., Baltimore	Naiwa	Cargo	8,800
Sun Ship Building Co., Chester, Pa.	Neponset	Cargo	10,000

GULF YARDS

Merrill-Stevens Co., Jacksonville, Fla.	Alapachee	Cargo	6,000
Tampa Shipbuilding Co., Tampa, Fla.	Everglades	Cargo	3,500

GREAT LAKES

American Shipbuilding Co., Cleveland.	Lake Gedney	Cargo	3,550
American Shipbuilding Co., Lorain, O.	Lake Eliko	Cargo	3,550
Superior Shipbuilding Co., Superior, Wis.	Lake Aurice	Cargo	3,550
Buffalo Dry Dock Co., Buffalo.	Lake Delancey	Cargo	3,550
Chicago Shipbuilding Co., Chicago.	Lake Berdan	Cargo	3,550
Detroit Shipbuilding Co., Wyandotte, Mich.	Lake Benbow	Cargo	3,550
Globe Shipbuilding Co., Superior, Wis.	Lake Borgne	Cargo	3,550
McDougall-Duluth Shipbuilding Co., Duluth.	Lake Helen	Cargo	3,100
Manitowoc Shipbuilding Co., Manitowoc, Wis.	Lake Winthrop	Cargo	3,400
Great Lakes Engineering Works, Ashtabula, O.	Lake Pleasant	Cargo	3,300
Great Lakes Engineering Works, Ecorse, Mich.	Lake Janet	Cargo	3,300
	Lake Pearl	Cargo	3,300
	Lake Silver	Cargo	3,300

PACIFIC COAST

Bethlehem Shipbuilding Corp. (Union Plant), San Francisco	Independence	Cargo	11,800
	Victorious	Cargo	11,800
	Defiance	Cargo	11,800
Hanlon Dry Dock & Shipbuilding Co., Oakland, Cal.	Major Wheeler	Cargo	5,500
Bethlehem Shipbuilding Corp. (Union Plant), Alameda, Cal.	Challenger	Cargo	12,000
Moore & Scott Shipbuilding Co., Oakland, Cal.	Yamhill	Refrigerating	9,400
	Yaquina	Refrigerating	9,400
	Guimba	Refrigerating	9,400
Los Angeles Shipbuilding & Dry Dock Co., Los Angeles	West Galeta	Cargo	8,800
	West Zula	Cargo	8,800
Schaw-Batcher Ship Works Co., San Francisco	Nantahala	Cargo	8,800
J. F. Duthie & Co., Seattle	Western Star	Transport	8,800
	Western Cross	Transport	8,800
Columbia River Shipbuilding Corp., Portland, Oreg.	Western Comet	Cargo	8,800
Todd Dry Dock & Construction Corp., Tacoma, Wash.	Puget Sound	Cargo	7,500
Seattle Construction & Dry Dock Co., Seattle.	Anacortes	Cargo	7,500
Skinner & Eddy Corp., Seattle	West Gambo	Cargo	8,800
	Delight	Cargo	8,800

Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

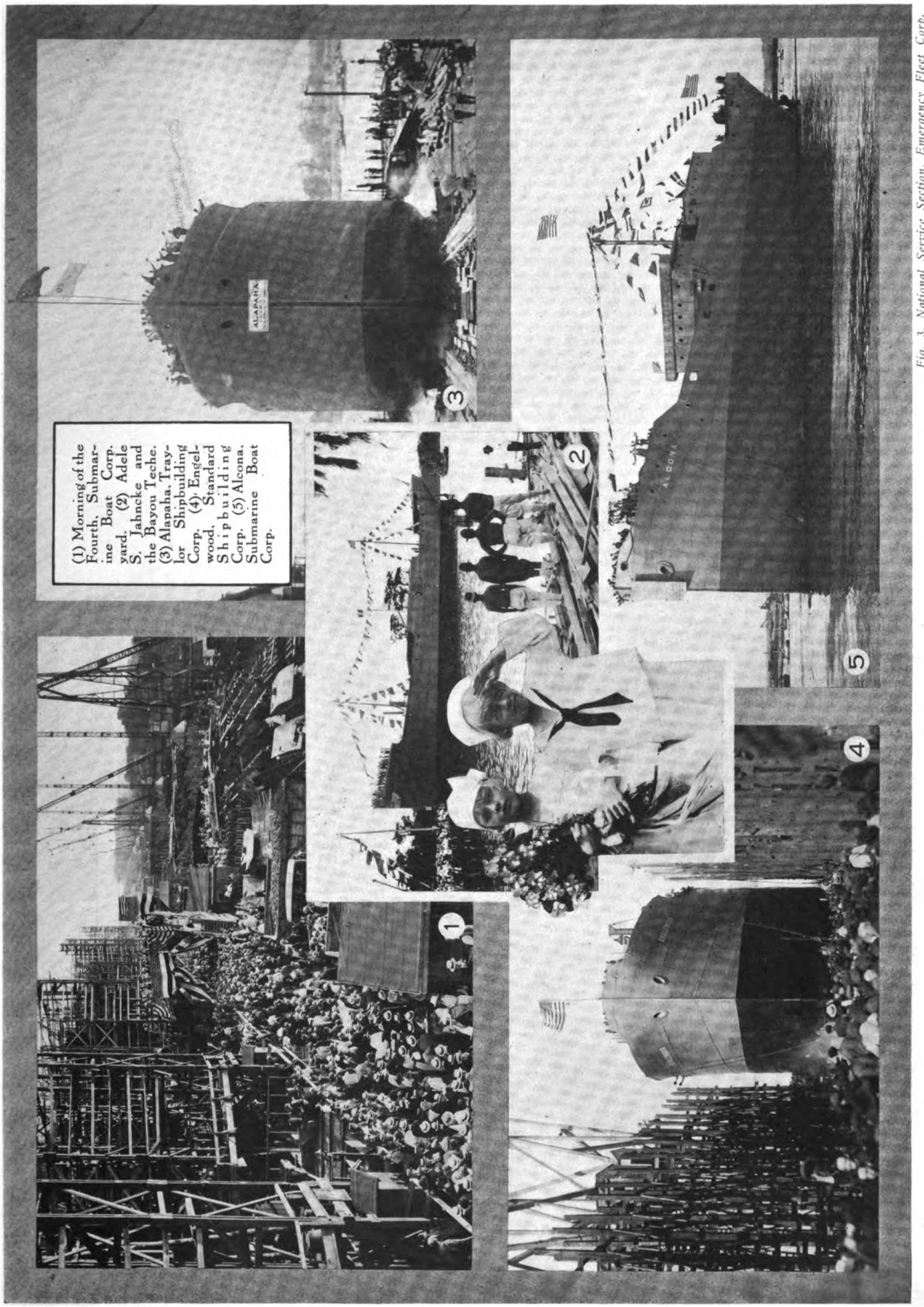
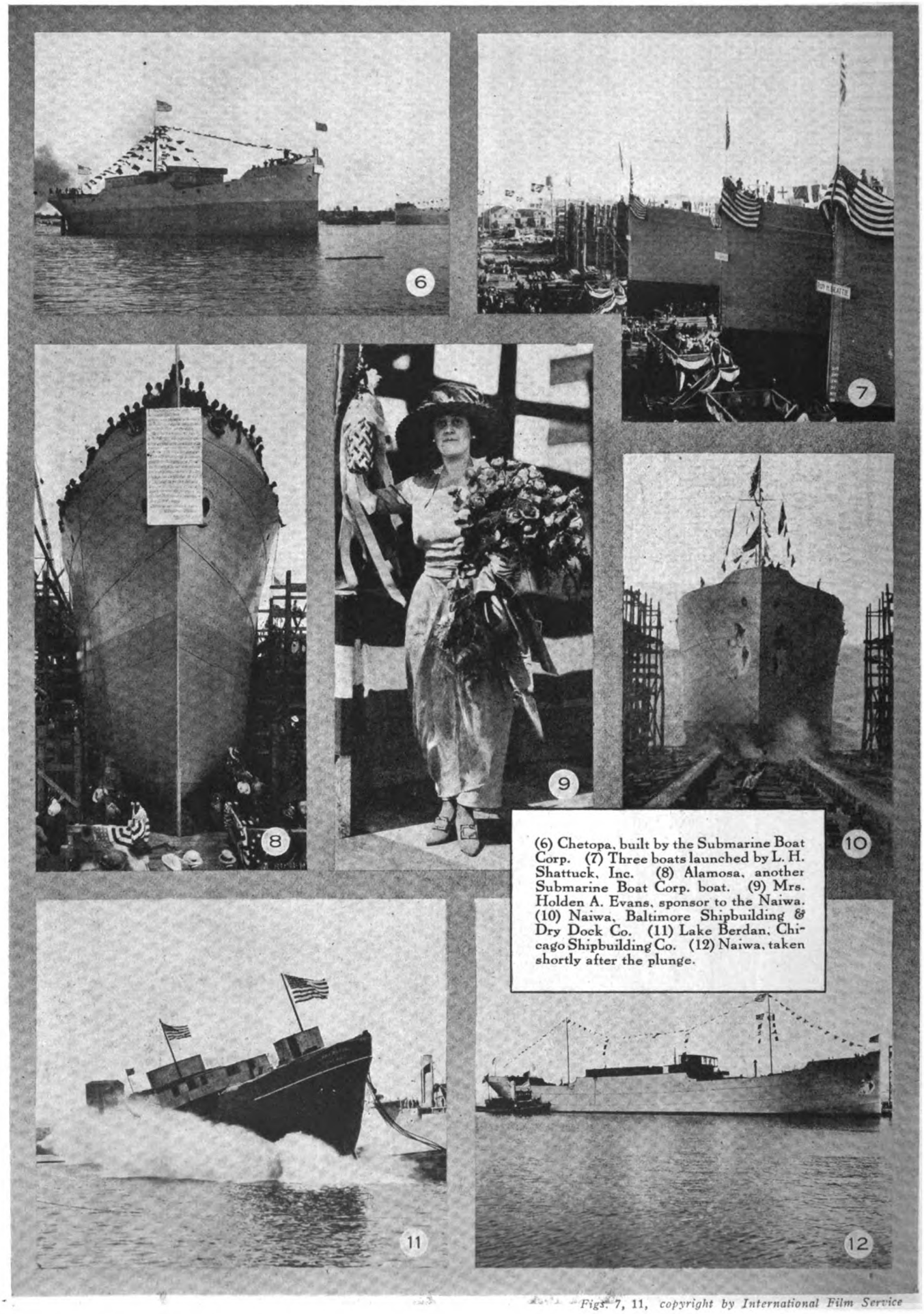

(1) Morning of the Fourth, Submarine Boat Corp. yard. (2) Adele S. Jahncke and the Bayou Teche. (3) Alapaha, Traylor Shipbuilding Corp. (4) Engelwood, Standard Shipbuilding Corp. (5) Alcona, Submarine Boat Corp.
1
2
3
4
5
ALAPAHA
ALCONA

Fig. 3, National Service Section, Emergency Fleet Corp. Fig. 4, copyright by International Film Service

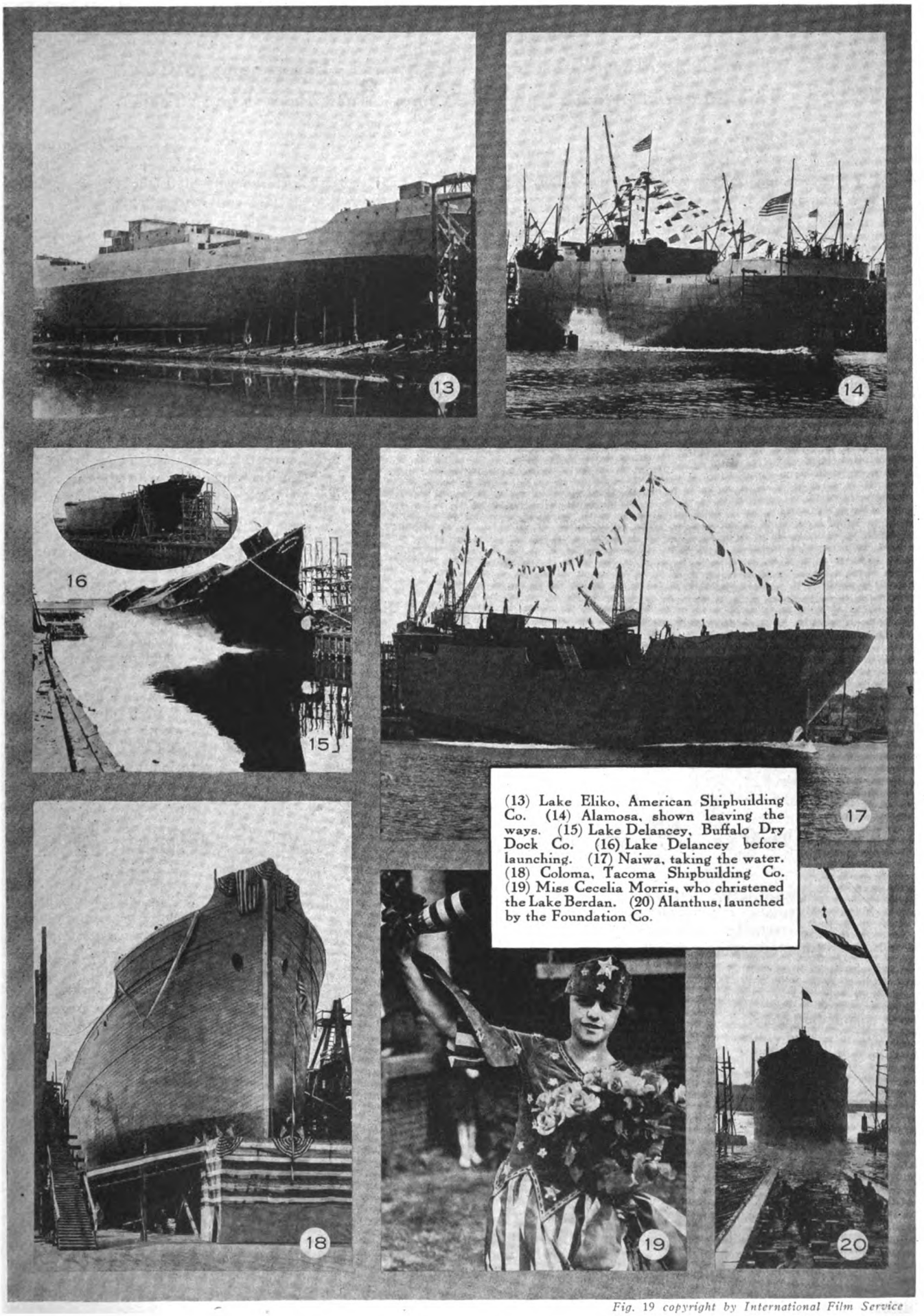
Generated on 2024-07-26 17:19 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



(6) Chetopa, built by the Submarine Boat Corp. (7) Three boats launched by L. H. Shattuck, Inc. (8) Alamosa, another Submarine Boat Corp. boat. (9) Mrs. Holden A. Evans, sponsor to the Naiwa. (10) Naiwa, Baltimore Shipbuilding & Dry Dock Co. (11) Lake Berdan, Chicago Shipbuilding Co. (12) Naiwa, taken shortly after the plunge.

Figs. 7, 11, copyright by International Film Service

Generated on 2024-07-26 17:19 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



(13) Lake Eliko, American Shipbuilding Co. (14) Alamosa, shown leaving the ways. (15) Lake Delancey, Buffalo Dry Dock Co. (16) Lake Delancey before launching. (17) Naiwa, taking the water. (18) Coloma, Tacoma Shipbuilding Co. (19) Miss Cecelia Morris, who christened the Lake Berdan. (20) Alanthus, launched by the Foundation Co.

Fig. 19 copyright by International Film Service

Generated on 2024-07-26 17:19 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

New Process to Meet Chain Problem

Chain Cable Must Withstand Severe Strains—Experiments to Cast This Material Arouse Interest—Chain Must Pass Rigid Tests

By H. Jasper Cox

WHEN riding at anchor in a tideway, or in cases of emergency, the safety of a vessel and lives of those on board frequently depends upon her anchor chain. For this reason, too much stress cannot be laid on the importance of having these chains not only of suitable length, weight and strength for the size of the vessel, but also of great reliability.

Realizing their importance in this respect, Lloyd's Register of Shipping, as long ago as 1853, required a certificate of test for all chain cables supplied to classed vessels, and in 1868 established at their own expense a public proving house in England for testing cables in a licensed machine. In 1871 the British government passed an act in parliament known as the anchor and chain cable act, making it compulsory to test all anchors and chains supplied to merchant vessels of British register.

In 1858 Lloyd's Register of Shipping had specified the length, size and weight of cables required for all classed vessels of different tonnage measurement, and after 1873 these cables were tested for tensile strength in accordance with the act. Random samples of each shot of chain were required to withstand a definite load without breaking, while every complete shot of chain, including the joining shackles, was required to be subjected to a certain proof load, called the statutory tensile test, without showing signs of rupture or undue strain. Similar legislation has been enacted in one or two other countries and today practically all of the ship classification societies have adopted the same standard of requirements.

The statutory tests laid down were based on the average results obtained with good hand-made wrought-iron chain. Good chain iron had a tensile strength of about 51,500 pounds per square inch with an elongation in 10 inches of from 23 to 30 per cent increasing with the size, and with a reduction of area of approximately 43 per cent.

Iron Chain Widely Used

Wrought iron chain, either hand or steam-hammer welded, has been used almost exclusively in ships to this day. Mild steel chain has been tried, but has so far proved either too ductile to retain its form under stress or too hard to insure reliable welds.

The essential qualities in anchor chain, in the order of their importance, may be summarized in the following order:

1.—Tensile strength;
2.—Weight;
3.—Resistance to shock;
4.—Accuracy of form of link after test;
5.—Uniformity of links;
6.—Resistance to wear and corrosion.

Without the weight and length to give the necessary sag and consequent spring to an outboard cable, the tensile strength required would be totally inadequate. When a vessel is riding easily there is considerable sag in her cable, and even when dragging anchor the sag is never quite taken out. It will be seen, therefore, that weight has an important bearing in connection with the strength.

Cables are frequently subjected to severe shocks or jerks which may be caused in a variety of ways. Those more commonly experienced are fast running over the wild cats, suddenly stopping the run of cable, links jamming in the chain locker or chain pipe and nipping at the hawse pipe which should not happen with a properly designed lead and hawse pipe, and nipping across the stem when the vessel is veering.

Accuracy of form and uniformity of links, including overall dimensions, are important for smooth and efficient running over the wild cats. Resistance to wear and corrosion are also important from the point of view of maintenance.

Abstracted from a report presented at the recent meeting of the American Society for Testing Materials. The tests to which the chain is subjected were described in THE MARINE REVIEW, July.

Proposed Specifications For Cast Chain

THE American Society for Testing Materials is considering proposed tentative specifications for electric cast-steel anchor chain as follows:

1—These specifications cover the cast steel to be used in all parts of the complete chain, including stud links, enlarged links, end links, shackles and shackle pins for anchor chain 1⅜ inch and over.

I—Manufacture

2—*(a)* The steel shall be made by the electric furnace process and all castings shall be produced in dry sand molds or cores.

(b) Each complete shot of chain shall be heat treated in such a manner that the treatment will be complete and uniform throughout its entire length.

3—The weight of each shot of chain shall be not less than the minimum weight specified in Table I.

II—Physical Tests

4—*(a)* For each complete shot of 15 fathoms obtained there shall be cast two test chains consisting of at least one link from each heat entering into the production of that shot of chain. Each link in the test chains shall be properly marked for identification with the heat from which it is poured. The test chains shall contain not less than three links.

(b) Such test chains shall become a basis as provided in section 5 for the acceptance or rejection of the material entering into the shot of chain they represent.

(c) Both test chains shall be heat treated with the complete shot of chain which they represent.

5—*(a)* One of the test chains shall be pulled in an approved static testing machine to a breaking load in accordance with the loads specified in Table II. If this first test chain withstands the required tensile breaking load, the shot of chain which it represents shall be accepted as far as this test is concerned.

(b) If any link in the first test chain fails to withstand the required tensile breaking load, the second test chain shall be subjected to the same test. Prior to this retest, the shot of chain and the second test chain may be subjected to a reheat treatment at the option of the manufacturer. If the second test chain passes the required test, the shot of chain which it represents shall be accepted so far as this test is concerned. If the second test chain fails to pass the required test,

Generated on 2024-07-26 17:19 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

the shot of chain that it represents shall be rejected.

6—*(a)* The complete shot of chain shall then be subjected to a proof test, which shall consist of anchoring each end thereof in an approved static testing machine and subjecting it to the proof load shown in Table II, according to its respective size. If the shot of chain passes this test it shall be accepted.

(b) If any link, or links, not exceeding three in any one shot of 15 fathoms, fail during the proof test a new link or links may be cast in and the shot retreated and again subjected to the proof tests. If it passes this retest the shot shall be accepted, provided the new link or links are poured from a heat represented in the test chain which has passed its prescribed breaking tests. If it does not pass this retest the shot of chain shall be rejected.

(c) If more than three links of any one shot of 15 fathoms fail on proof test, the shot shall be rejected.

7—In addition to the breaking and proof tests specified in Section 5 and 6, the material entering into the manufacture of the chain shall be subjected to such shock tests as shall be agreed upon between the manufacturer and the purchaser, in order to determine its shockresisting qualities.

8—In the event that only one test chain is subjected to test, the remaining test chain may be united with, and become a part of another complete shot of chain, and shall be considered acceptable although not represented by any link in the test chains for the new shot.

III—Dimensions and Permissible Variations

9—All castings shall conform to the dimensions and permissible variations agreed upon between the manufacturer and the purchaser.

IV—Finish

10—All castings shall be free from shrinkage, porosity or other injurious defects which would affect the strength of the chain and shall have a workmanlike finish.

V.—Marking

11—Each shot of chain accepted shall be legibly stenciled in accordance with the requirements of the purchaser.

VI—Inspection

12—The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the chain ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the chain is being furnished in accordance with the specifications. Tests and inspection at the place of the manufacturer shall be made prior to shipment and shall be so conducted as not to interfere unnecessarily with the operation of the works.

The American Society for Testing Materials desires criticisms of the above tentative specifications. These should be sent by Jan. 1 to C. L. Warwick, secretary of committee A-1 on steel, University of Pennsylvania, Philadelphia.

Table I

Minimum Weight Per Shot of 15 Fathoms

Size of chain, in.	Weight, lb.	Size of chain, in.	Weight, lb.	Size of chain, in.	Weight, lb.
1 3/8	1,625	2 1/8	3,785	2 7/8	7,015
1 7/16	1,775	2 3/16	4,015	2 15/16	7,330
1 1/2	1,935	2 1/4	4,245	3	7,650
1 9/16	2,090	2 5/16	4,485	3 1/16	7,980
1 5/8	2,235	2 3/8	4,725	3 1/8	8,320
1 11/16	2,410	2 7/16	4,960	3 3/16	8,660
1 3/4	2,590	2 1/2	5,265	3 1/4	9,010
1 13/16	2,785	2 5/16	5,535	3 5/16	9,360
1 7/8	2,975	2 5/8	5,815	3 3/8	9,725
1 15/16	3,175	2 11/16	6,105	3 7/16	10,095
2	3,355	2 3/4	6,405	3 1/2	10,475
2 1/16	3,570	2 13/16	6,705	3 3/4	12,025

Table II

Proof and Breaking Loads in Pounds

Size of chain, in.	Proof test, lb.	Breaking test, lb.	Size of chain, in.	Proof test, lb.	Breaking test, lb.	Size of chain, in.	Proof test, lb.	Breaking test, lb.
1 3/8	114,000	160,000	2 1/8	255,000	357,000	2 7/8	431,500	604,000
1 7/16	124,500	175,000	2 3/16	270,000	378,000	2 15/16	444,500	622,000
1 1/2	131,500	184,000	2 1/4	285,000	400,000	3	457,000	640,000
1 9/16	137,500	193,000	2 5/16	302,000	423,000	3 1/16	469,500	658,000
1 5/8	149,000	208,000	2 3/8	318,500	446,000	3 1/8	482,000	676,000
1 11/16	160,500	225,000	2 7/16	335,000	470,000	3 3/16	494,500	693,000
1 3/4	173,000	242,000	2 1/2	353,000	494,000	3 1/4	506,500	710,000
1 13/16	185,500	260,000	2 5/16	366,000	512,000	3 5/16	518,500	726,000
1 7/8	198,000	278,000	2 5/8	379,000	531,000	3 3/8	530,500	742,000
1 15/16	211,500	296,000	2 11/16	392,500	550,000	3 7/16	541,500	758,000
2	226,000	316,000	2 3/4	405,500	568,000	3 1/2	553,000	775,000
2 1/16	240,000	336,000	2 13/16	418,500	586,000	3 3/4	588,500	824,000

Carferry Breaks Record

The officials of the Mackinac Transportation Co., St. Ignace, Mich., announce that in May the carferry CHIEF WAWATAM set a new record in freight transportation across the straits. Purser Wenzel Jones gave out the following figures: Freight cars ferried for month, 8750; passenger cars, 544; total cars 9294. To accomplish this feat, the vessel was obliged to make 231 round trips. This is the largest number of cars ever carried by the Mackinac Transportation Co. in a single month, exceeding the months when two boats were in commission.

Book Review

The Men on Deck, by Felix Riesenberg; cloth; 320 pages, 5 x 7½ inches; published by D. Van Nostrand Co. and furnished by THE MARINE REVIEW for $3.00.

The author is a master mariner and has taken great pains to bring together knowledge that will prove of value not only to the thousands of young men now entering the merchant service but to the older officers as well.

It is pointed out that no standard form of sea training has yet come to take the place of the old-time apprentice system of sail and that able as they may be, officers of mixed training are being thrown together constantly while crews are generally picked up on the beach. Under these conditions, the author points out, it is not to be wondered at that many ideas prevail as to the proper way of doing things. Seamen also are often confused through lack of knowledge as to just what is expected of them because one vessel may be run one way and another in a way quite different. It is evident that this lack of uniformity at sea is bound to breed disorder in situations where order and discipline are of the utmost importance.

It is for the purpose of helping officers and seamen thoroughly to understand their various duties that this book was written. The book is divided into 25 chapters and among the subjects treated are: The master, and laws affecting his duties; liability of owners, masters and shippers; junior officers and cadets; laws defining officers of the merchant marine; the quartermaster, carpenter, boatswain and able seamen; and discipline at sea. An appendix contains the customs districts, ports and subports of the United States, while another defines the sea library, giving a list of such books as every ship's officer should possess. The book is written from a practical point of view in a clear, logical style.

Generated on 2024-07-26 17:19 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

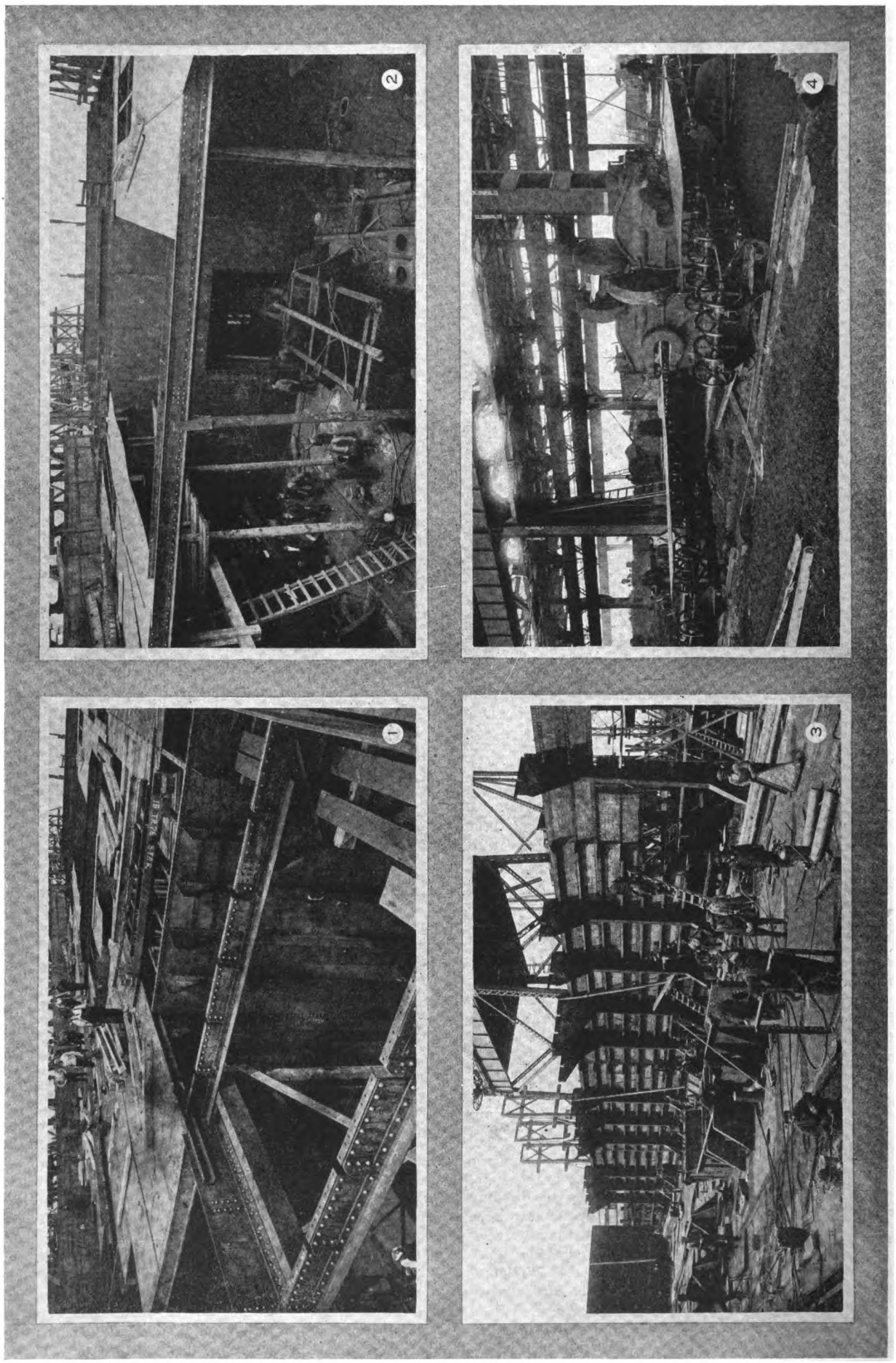


FIG. 1—BOW OF LIBERTY, SHOWING CONSTRUCTION. FIG. 2—STERN SECTION, SHOWING TURBINE BASE. FIG. 3—DETAILS OF HULL CONSTRUCTION OF LIBERTY.
FIG. 4—PORTION OF PLATE AND ANGLE SHOP, SHOWING DOUBLE END PUNCH EQUIPPED WITH TABLE

Generated on 2024-07-26 17:20 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Builds Plant While Fabricating Ships

How New Atlantic Yard Met Demand for Speed by Simultaneous Ship and Plant Construction—Layout Embodies New Arrangement

By E. C. Kreutzberg

LIBERTY, the first fabricated steel vessel of the Isherwood or longitudinal frame type, was launched by the Federal Shipbuilding Co., Kearny, N. J., June 19. Her keel was laid Nov. 15, 1917, and she was built in a yard whose construction was begun only last August. The plant of the Federal Shipbuilding Co. comprises 10 ways, is now about 85 per cent completed, and the keel for the eleventh vessel recently was laid.

Unlike most of the yards which have been rushed to completion since our entry into the war in April, 1917, the Federal shipyard represents a compromise between the self-contained and the assembling types of shipbuilding plants. That is, part of the steel for shipbuilding is fabricated elsewhere and part at the yard. Approximately 60 per cent of the hull steel, comprising that for the amidships section, is fabricated by the American Bridge Co. The remaining 40 per cent, which comprises the steel for the bow and stern, is done at the yard. Thus, the Federal company itself fabricates all of the difficult curved work and calls upon the bridge company only for straight work to which the multiple punch is applicable. By this arrangement, it is unnecessary for the bridge company to install extensive equipment and acquire skill along special lines which may prove valueless after the war.

The shipyard's facilities include a 175 x 925-foot plate and angle shop provided with a furnace department, a 125 x 500-foot machine and pipe fitting shop, a 160 x 500-foot boiler shop, a forge shop, foundry, rigging loft, paint shop, mold loft, carpenter and joiner shop, and a pneumatic tool room. These departments are located in structures of an unusually substantial character. While some of these buildings have not been placed in operation, work in equipping them is progressing so rapidly that no delays are expected in fitting the vessels out in accordance with the schedule. The transportation of materials throughout the plant is accomplished by a complete railroad comprising about 12 miles of track.

Several ideas which are novel in shipbuilding methods have been embodied in the layout and operation of the Federal plant. One of them is the location of the mold loft immediately above the plate and angle shop. This arrangement makes it possible to operate the latter along the same lines as a modern bridge shop. The proximity of the mold loft and plate and angle shop promotes the production of all hull pieces to exact templates and eliminates all work of a "building-up" character. Thus the Federal company is able to avoid the practice, prevalent at most self-contained shipbuilding plants, of letting contracts to its workmen for laying out and building shell plating, floors and other parts. The plate and angle shop is provided with bending slabs, punches, shears, bending rolls, presses, cranes, furnaces, and other equipment for bending and fabricating ship steel. A unit which now is being installed is a 700-ton hydraulic press for bending door frames and keel sections.

The boiler shop which is rapidly nearing completion, is to have capacity for

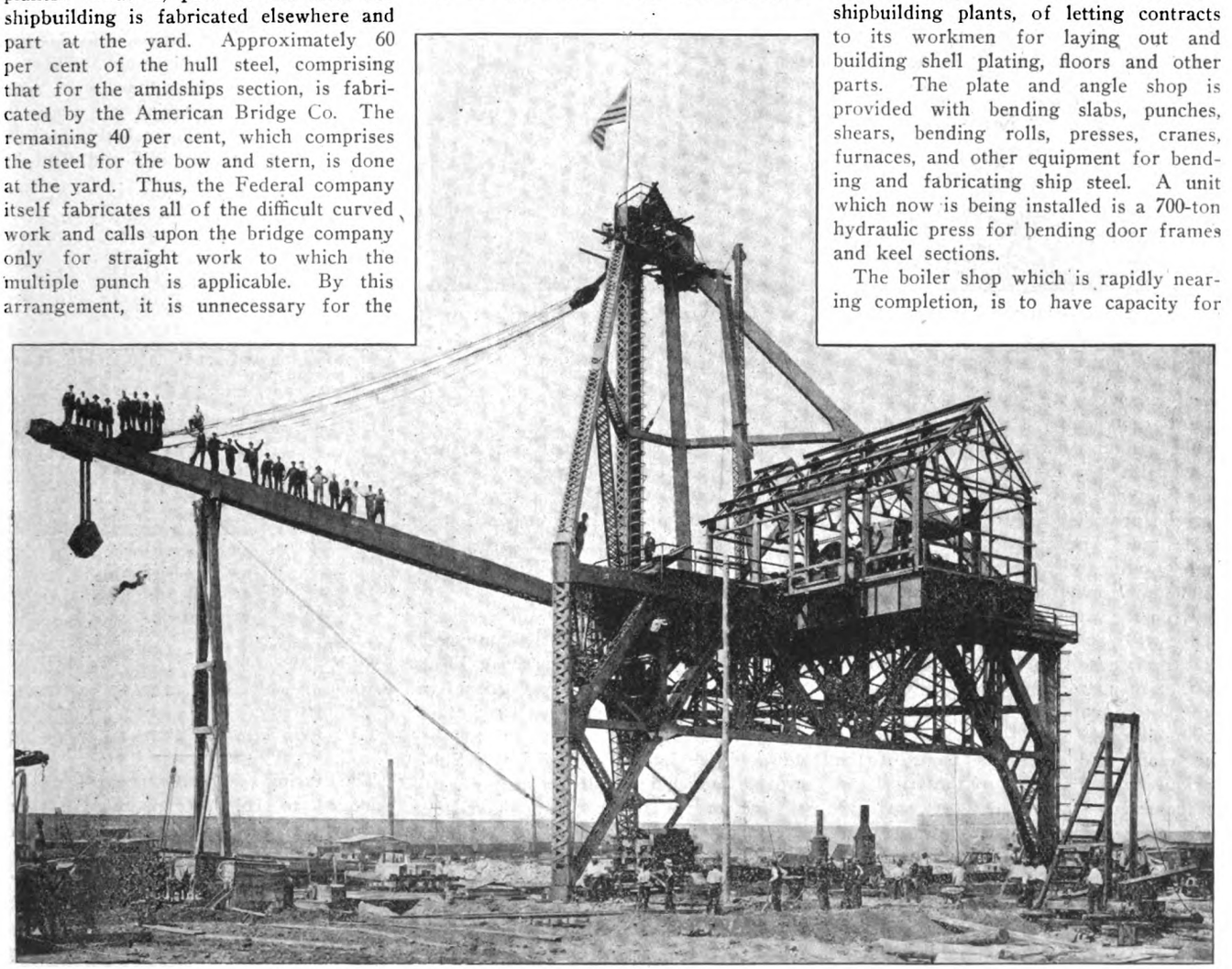


FIG. 5—SWINGING ARM TYPE DERRICK WHICH COMMANDS FITTING-OUT DOCK. THIS CRANE HAS CAPACITY FOR 100 TONS, AND IS SAID TO BE THE LARGEST OF ITS TYPE

Generated on 2024-07-26 17:20 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

producing two Scotch type boilers per week. All other machinery and apparatus, including pumps, winches, turbines, etc., are temporarily obtained from outside sources. However, when all the shop buildings have been completed and equipped, it is proposed to make all of the propelling and auxiliary equipment at the plant.

Eight of the 10 shipbuilding ways are capable of accommodating vessels up to 425 feet long. The remaining two will take vessels up to 400 feet long. Between each pair of ways operates a traveling gantry crane, which is provided with two 15-ton booms, one commanding each way. These gantry cranes may be provided with four booms each if desired. The gantries are sufficiently high to afford clearance for carloads of shipbuilding material which are delivered between the ways as required. In front of the ways and extending the full length of the plate and angle shop is a 35-ton, 80-foot span, traveling crane mounted on a 1000-foot runway. The material for shipbuilding is sorted with the aid of this crane and placed in front of the various ways. In front of the ways, and at the ends of the spaces between each pair of ways are spaces devoted to assembling bulkheads, shaft tunnels, counters, deck houses, etc., so that they may be introduced into the hulls as units, thus reducing the time of construction.

The fitting-out basin is 240 x 1000 feet and the material which was removed by wet dredging during its construction, was discharged on various low lying parts of the shipbuilding site in order to make the entire tract available. The fitting-out basin is large enough to accommodate four vessels along the docks, and four in the middle of the basin. It is provided with a 100-ton derrick of the swinging arm type, mounted on a fixed base. This is believed to be the largest crane of this kind in the world. The height of the base is 46 feet and the boom extends 97 feet above the base, giving the derrick an overall height of 104½ feet.

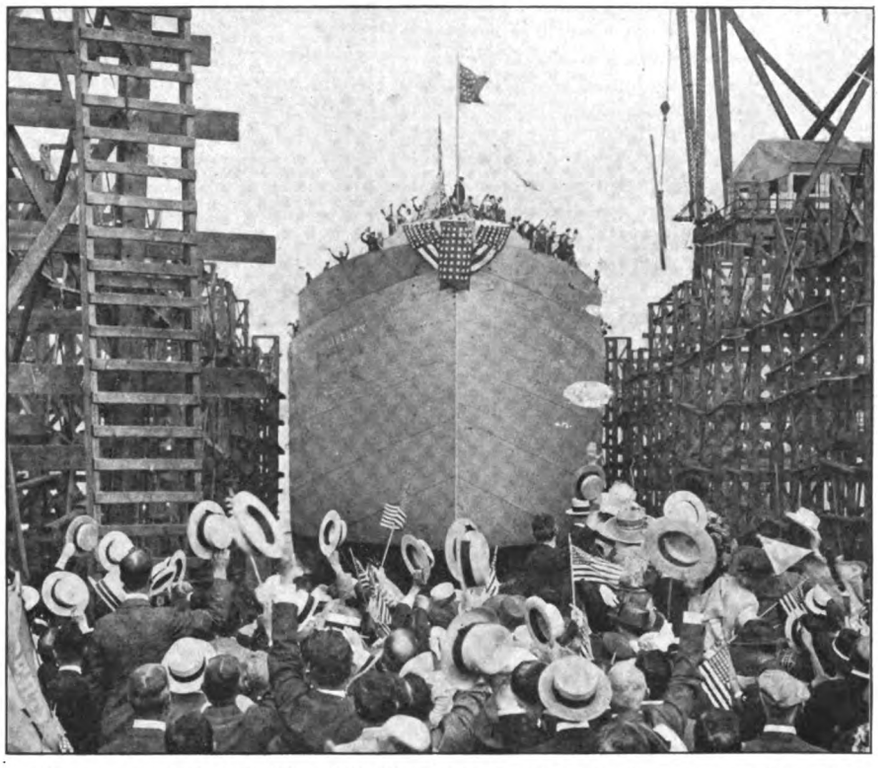


FIG. 6—LAUNCHING OF LIBERTY, FIRST FABRICATED STEEL VESSEL OF ISHERWOOD TYPE, AT FEDERAL SHIPBUILDING CO.'S YARD, KEARNY, N. J., JUNE 19

The Federal Shipbuilding Co. is a subsidiary of the United States Steel Corp. Its president is Elbert H. Gary, chairman of the finance committee of the Steel corporation, and its vice president and general manager is Robert McGregor.

The Federal company initially received a contract to build ten 9600-ton steel cargo carriers for the Emergency Fleet corporation. Since then the order has been increased to 30 vessels of this size. The second vessel is to be launched the latter half of July. Subsequent launchings will be at the rate of one every 20 days, and later the intervals are to be reduced to 14 days. For the next few months about five weeks will be required for fitting out the vessels after they are launched. Later the fitting out time will be reduced to three weeks.

With a length of 170 feet and a beam of only 20 feet, the United States torpedo boat destroyer ROWAN, recently sold to a San Francisco junk concern for $14,000, is to be used as a water barge on the bay. Her extreme length and narrow beam militate against her use in freight service.

Soo Canal Report

Freight shipments through the Soo canal in 1918 continue to exceed those of 1917. The greatest gain is to be found in shipments of iron ore, eastbound. To July 1, 1918, iron ore shipments have totaled 18,816,263 net tons, an advance of 3,861,445 net tons over the 1917 shipments of 14,954,818 net tons for the same period. No stone was shipped either east or west in 1917, while this year 7790 net tons have already passed through the canal east bound and 156,155 net tons have been sent west. Soft coal shipments also show an increase in 1918. In 1917 3,160,853 net tons passed up through the canal, as compared with 3,615,079 tons in 1918, a gain of 454,256 net tons.

On the other hand grain shipments for 1918 continue to lag far behind those of 1917. To July 1, 1918, 22,115,531 bushels of grain, including wheat, have been sent down through the canal. This is 77,651,906 bushels less than was sent through in the same period last year.

Detailed figures follow showing comparative shipments for 1917 and 1918:

EASTBOUND

	To July 1, 1917	To July 1, 1918
Lumber, M. ft. B. M.	75,188	87,777
Flour, barrels	2,150,188	2,144,730
Wheat, bushels	67,574,955	11,107,550
Grain, bushels	32,192,482	11,007,981
Copper, net tons	35,809	25,698
Iron ore, net tons	14,954,818	18,816,263
Pig iron, net tons	.....	.....
Stone, net tons	.....	7,790
Gen. merch., net tons	51,716	15,665
Passengers, number	2,592	2,114

WESTBOUND

Coal, soft, net tons	3,160,853	3,615,079
Coal, hard, net tons	661,948	435,102
Iron ore, net tons	20,145	26,632
Mfctd. iron and steel, net tons	28,850	11,051
Salt, net tons	220,792	25,590
Oil, net tons	.....	80,425
Stone, net tons	.....	156,155
Gen. merch., net tons	51,716	121,907
Passengers, number	2,590	2,027

SUMMARY

Vessel passages, No.	5,980	6,052
Registered ton., net	17,635,878	18,831,416
Freight:		
Eastbound, net tons	18,002,968	19,776,612
Westbound, net tons	4,288,377	4,471,941
Total frgt., net tons	22,291,345	24,248,553

The racing yacht GERMANIA, which belonged to Herr Krupp von Bohlen and which was seized by the British authorities four years ago, has been placed by its present owner, Christopher Hannevig, at the disposal of the United States shipping board. The vessel was designed under the personal supervision of the kaiser and is now being used by student officers of the United States navy.

Generated on 2024-07-26 17:20 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

HOG ISLAND'S COMPRESSED AIR SYSTEM

BY B. K. PRICE

Riveting Has a Twofold Meaning for the Patriotic Workers at Hog Island, Every Rivet in a Ship Plate Serving to Rivet Democracy's Ideals on the World

IN expediting the construction of ships at Hog island extensive use of compressed air was recognized as a vital factor and considerable attention was given to this phase of the work in planning the huge yard last year. As a result there is at Hog island today, the second largest compressed air plant in the world, planned and built under supervision of several of the country's most eminent engineers.

The plant was planned to supply compressed air at 100 pounds initial pressure. It comprises five separate air compressor units which supply the shipways and shops and two smaller units which supply the marginal wharf. By dividing the air compressing capacity of the yard into units and inserting valves in a main pipe running along the heads of the slips and wet basins the danger of a shutdown of the entire air system is practically eliminated. The five larger compressor units are located at about the center of each of the five groups of 10 ways, while the two remaining units are along the marginal wharf, each serving half of the total number of eight wet basins. These various compressor houses also serve as high voltage substations.

Leading from each of the compressor houses along the shipways is a 12-inch pipe through which the air is fed into a 10-inch main, extending parallel to and 98 feet from the heads of the slips for more than a mile. This main distributes the air into 6-inch pipes, one of which runs on each side of the keel blocks in each slip. A tee and manifold with six outlet cocks is inserted in these pipes at 20-foot intervals along the length of the keel. Another main, 6 inches in diameter and connected to the larger one, extends along the marginal wharf, a distance of more than a half mile, and 3-inch branches are taken down on each side of the wet basin piers. Outlets similar to those on the building slips are inserted in these branches. Provision for expansion and inspection is made by the introduction of U-bends and the use of box trenches along the main lines.

Compressed air also is used extensively by the shop group and it is supplied by tapping the 10-inch main and leading a 6-inch branch back and across the front of the group, where suitable extensions are made to each shop.

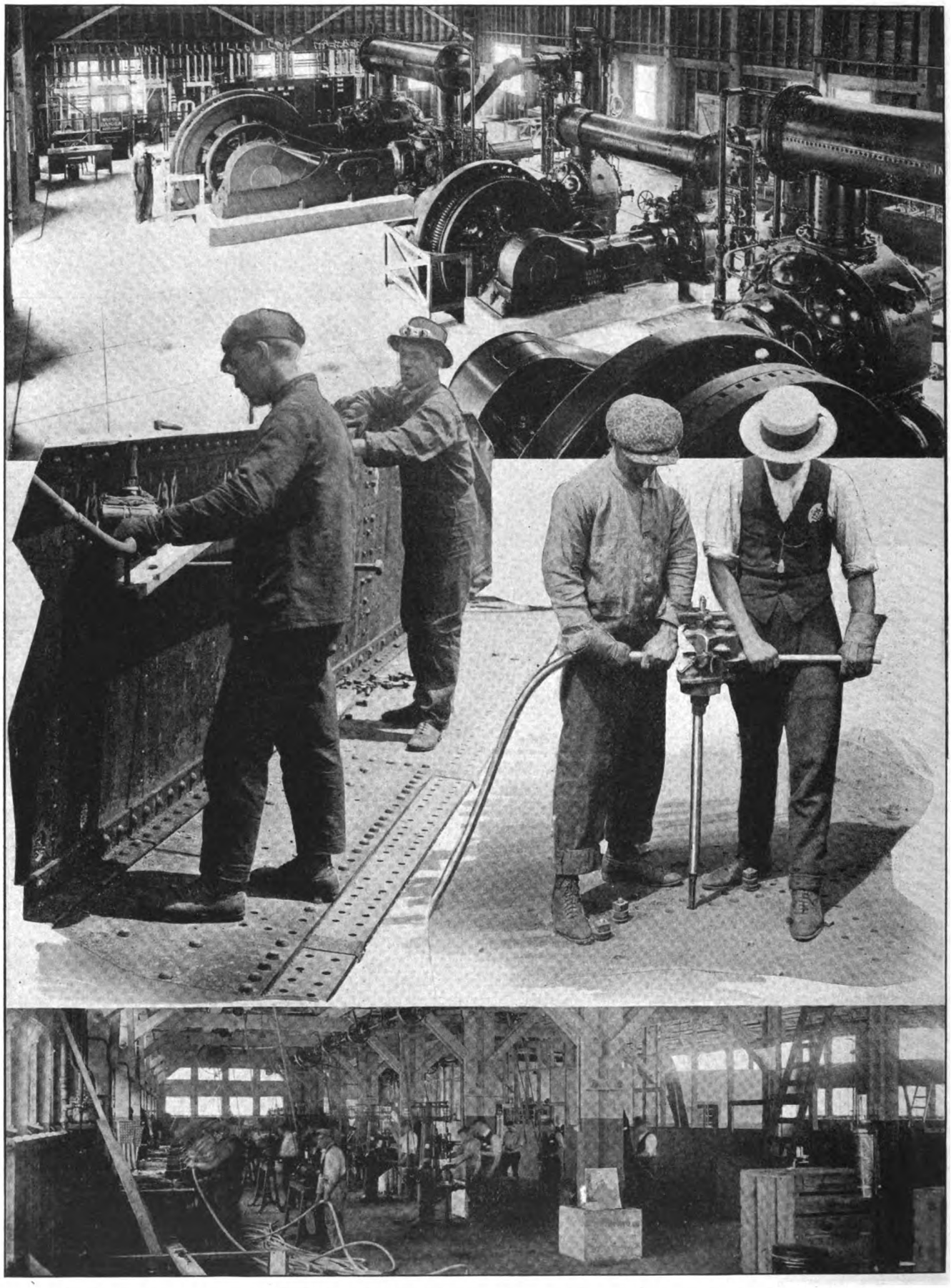
Description of Equipment

The five larger units are of identical type and each is equipped with three Ingersoll-Rand air compressors. Two of these compressors are 40 and 25½ x 30 inches, direct connected to a 1020-horsepower, General Electric 400-volt, 3-phase, 60-cycle synchronous motor, having a speed of 138½ revolutions per minute. The actual delivered capacity of each is 5320 cubic feet of free air per minute. The third compressor is 28 and 17½ x 21 inches, direct connected to a 450-horsepower, General Electric 4000-volt, 3-phase, 60-cycle synchronous motor, having a speed of 180 revolutions per minute. The actual delivery capacity of this unit is 2275 cubic feet making the total capacity of the plant 12,915 cubic feet of free air per minute.

Some of the difficulties not infrequently arising in the operation of air tools are due to moisture in the air, or "wet air." This moisture on being carried into the machines tends to wash away the lubricant and to increase wear by leaving bare surfaces in contact. It also condenses and collects in the pipe lines interfering with the free passage of air, and may freeze and burst the pipes in cold weather. This disadvantage is particularly serious in work in the open. To eliminate it, each of the compressors has been equipped with an after-cooler which serves to remove the moisture from the compressed air before it enters the distribution system. This is accomplished by cooling the air to a point at which the moisture will condense and accumulate in suitable receptacles to be drained at intervals. The after-coolers serving the two large compressors in each plant along the ways have a cooling surface of approximately 1005 square feet, and the one serving the smaller compressor 505 feet.

Intake air is drawn from the outside through cast iron or salt-glazed pipe cast in the concrete foundations and terminating in sheet metal cowls 12 or 13 feet above the ground. A suitable piping system is installed for leading the discharge air from the compressors to a receiver which acts as a separator and serves to dampen pulsations for the complete unit. Cooling water for the

Generated on 2024-07-26 17:20 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



TYPICAL SCENES AT THE HOG ISLAND SHIPYARD. UPPER ILLUSTRATION, ONE OF THE FIVE LARGER AIR COMPRESSING UNITS; LOWER, THE INTERIOR OF THE AIR TOOL SHOP; LEFT, COUNTER SINKING HOLES FOR FLUSH RIVETS; RIGHT, REAMING RIVET HOLES

Generated on 2024-07-26 17:20 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

compressor jackets, inter-coolers and after-coolers, is supplied by a system of water pipes which later discharge the water into the Delaware river, along which the yard is located.

Indicating and recording thermometers and pressure gages are installed in the pipes. An air-flow meter is also to be installed in the 12-inch discharge line leading from each compressor plant, between the receiver and the 10-inch air main.

Great Number of Tools Used

The two plants which feed into the 6-inch main at the head of the wet basins are similar to the others except they contain only two of the smaller compressors, making the total capacity of each plant 4550 cubic feet of free air per minute. This makes the entire compressor capacity of the yard 73,675 cubic feet per minute. Maintenance of the compressors is facilitated by a 10-ton, hand-operated traveling crane. For storage and operating maintenance of the air tools used on the ways, an air tool house has been built at the head of each group of five building slips. These buildings are equipped with grinding and lubricating machinery and storage racks.

An idea of the volume of compressed air required in building the ships may be obtained from the following list of pneumatic tools in use: 1675 riveters of one size and 100 of another; 1325 holders-on; 200 jam riveters of one size and 480 of another; 450 nonreversing pneumatic drills; 200 corner drills; 150 breast drills; 100 chipping and caulking hammers of one size and 1250 and 500 of other sizes respectively; and 50 grinders. Eight hundred rivet heating forges are to operate from compressed air lines. Equipment necessary to the operation of the pneumatic tools includes about 300,000 feet of rubber hose, 6500 sets of pneumatic hose couplings, 150 bottom riveter frames, 12,000 chisel blanks and 15,000 rivet sets.

June Ore Shipments

Ore shipments for June establish a new record to supersede those of 1916 and 1917. The total shipments from upper lake ports for June, 1918, aggregate 9,921,860 tons. This exceeds the June, 1917 shipments by 281,869 tons. The 1917 shipments in turn were greater than those of 1916, which totaled 9,607,576 tons, the 1917 figure being 9,639,991 tons. Although the June, 1918, shipments are in excess of the 1916 record, the total shipments to July 1, 1918, are less than they were for the same period in 1916. The shipments to July 1, 1916, were 19,615,567 tons; to July 1, 1917, were 16,135,135 tons; and for the same period in 1918 are 18,949,730 tons. This year's shipments, therefore, have bettered the 1917 shipments, but still lag behind 1916.

The following table shows the June and season's shipments by ports:

Port	June, 1918	To July 1, 1918
Escanaba	1,077,871	1,733,366
Marquette	547,927	1,053,678
Ashland	1,137,921	2,036,068
Superior	2,510,974	4,698,565
Duluth	3,164,296	6,276,139
Two Harbors	1,482,871	3,151,914
Total	9,921,860	18,949,730
1918 increase	281,869	2,814,595

Lake Erie Receipts

Lake Erie ports received 7,816,993 tons out of the total of 9,921,860 tons which were shipped from upper lake ports in June, as shown by figures compiled by THE MARINE REVIEW. The balance on dock July 1 was 6,262,997 tons as against 4,823,523 tons on July 1, 1917. The detailed figures are:

Port	Gross tons
Buffalo	1,414,311
Erie	265,622
Conneaut	1,068,118
Ashtabula	1,756,023
Fairport	330,360
Cleveland	1,604,742
Lorain	614,094
Huron	242,726
Toledo	434,117
Detroit	86,880
Total	7,816,993

Will Construct Concrete Boats

Negotiations have been in progress for some time between the Aberthaw Construction Co., Boston, and the City of Providence, R. I., for the lease of land at Fields point for use as a shipyard. These are now completed and work will start immediately on laying out the yard and constructing ways for the building of concrete boats.

The shipyard will be about 600 feet wide with a 300-foot depth. Options have been taken for enlarging this if necessary. The Aberthaw company will build two ways immediately. These two ways will be used for the construction of two concrete lighters to be built from the company's own design. The company also plans to build concrete canal boats and watertank boats for the government.

The company built the Victory plant at Squantum, Mass., and for 25 years has specialized in concrete construction.

The Emergency Fleet corporation has awarded a contract to build a third Ferris-type wooden steamer to the Benecia Shipbuilding Co. near San Francisco. One boat of this type that the company built was launched in July and another will be put overboard in August.

Three vessels, aggregating 9600 deadweight tons, have been chartered by the Robert Dollar Steamship Co. and are to be placed in the Asiatic service, loading at either Vancouver or Puget sound ports. The vessels, all owned by French interests, are the motor ship ALABAMA, the auxiliary powered schooner BOWLES and the steamer OAKWOOD.

Book Review

Laying Off, or the Geometry of Shipbuilding, by Edward L. Attwood and I. C. G. Cooper; cloth; 120 pages, 5 x 8 inches; published by Longmans, Green & Co. and furnished by THE MARINE REVIEW for $2.

The book is by two English authors and it is written from an up-to-date point of view. The latest practices are explained at length. The work is adapted as a textbook for the use of students. The introductory chapter treats of descriptive geometry in order to lay a satisfactory foundation of knowledge for the subsequent work. The book is well written. The subject is handled exhaustively, covering descriptive geometry; the mold loft floor and appliances for laying off; work on the mold loft floor; models; mold work on the floor, and miscellaneous problems. An appendix has also been added which contains a syllabus of board of education examination, questions set at examinations and other problems. The book contains 121 illustrations which have been carefully executed in order to make them self-explanatory as far as possible.

Despite the representation of the San Francisco Shipowners' association that the charter rate of $6.25 per month per deadweight ton is not sufficient, according to their books, to enable owners to run their vessels without a small loss in most instances, the United States shipping board has definitely refused to raise the commandeer charter rate for wooden steam schooners.

The Bethlehem Shipbuilding Corp. is to build ten 25,000-ton displacement troop ships for the war department at the new Alameda, Cal., unit. The construction of each of these vessels will require 8000 tons of steel shapes and plates.

The Pacific Steamship Co. is to have a fourth vessel, the 7500-ton steel cargo carrier PUGET SOUND, assigned to her for operation in August when she will be completed by the Todd shipyards, Tacoma, Wash.

With a capacity of 5000 tons, the second largest marine railway on the Pacific coast and among the largest in the United States, has been placed in operation at the new Barnes-Tibbitts shipbuilding yard at Alameda, Cal.

Generated on 2024-07-26 17:21 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

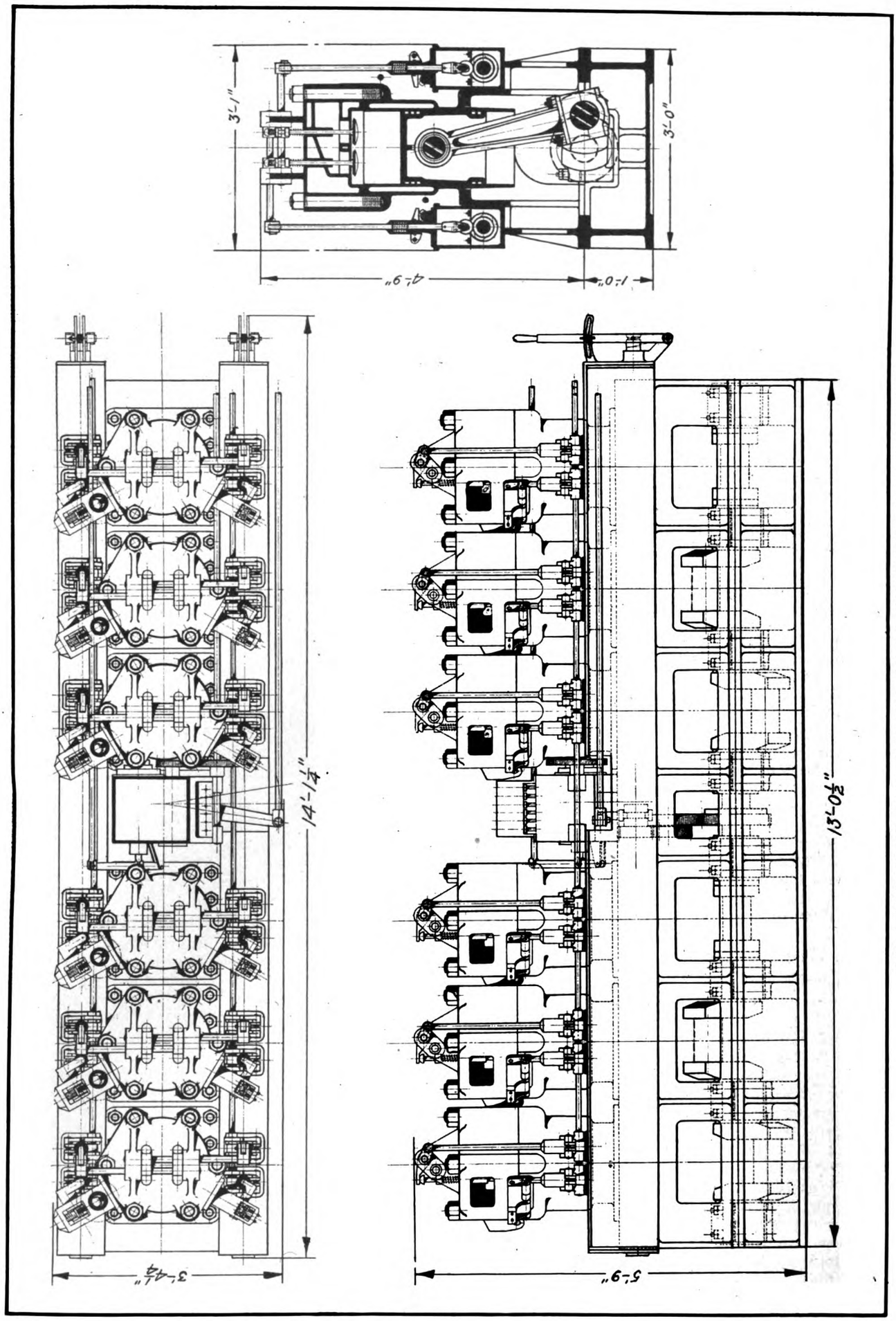


FIG. 1—ELEVATION, PLAN AND SECTION OF WENTWORTH TYPE OIL ENGINE

Generated on 2024-07-26 17:21 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Rational Design for an Oil Engine

Low Compression Pressures Advocated and Steam Recommended For Starting—Design Based on Analysis of Underlying Principle

By John F. Wentworth

THE actual design presented in this paper was made to fit the needs of the submarine, which requires a light and reliable type of engine. If we were to consider a design suitable for a freighter, the matter of weight would not be so important, but the matter of reliability and low upkeep would be more important. An attempt has been made in presenting this design to give data, and substantiating reasons for opinions where perhaps satisfactory data cannot be presented, so that this paper may be taken as a basis and, if desired, other designs may be worked up in any well-organized drafting office.

In designing an engine there are several points to be settled upon as a matter of policy; from this point the design is not peculiar to the oil engine but rather is a straight matter of mechanical design. For instance, it has been suggested that the matter of bearing pressures is something to be settled by oil-engine experience. The opposite viewpoint is taken. It is felt that the bearing pressure in the oil engine should follow the same laws that are followed in other machines of somewhat similar action. For instance, we find the bearing pressure allowed in a locomotive is higher than that allowed in a triple-expansion steam engine. The reason is very easy to understand. In the locomotive the maximum pressure lasts for but a short part of the stroke, especially in single expansion locomotives. On the other hand, in the compound marine engine the cut-offs are late and the maximum pressures extend over a much longer part of the stroke. Since the lining point is the heating of the bearings, and since a machine which has an intermittent action has a greater time to dispose of the heat generated by the pressure, the maximum pressure per square inch may run higher. Engineering science has many examples of how this works out in practice, and it would seem that such question need not be of great moment to an organization skilled in machine design. This point is mentioned so that it may be understood that, in some, if not in many instances, data from work quite dissimilar to the design of the oil engine have been used. In such cases the application of the force is similar, even though the resulting design may differ very much from the completed oil engine.

The next point in a general consideration of the problem is the actual experimental data. The third point consists in following certain deductions derived from experimental data and from a theoretical consideration of points in the design as affected by this experimental data.

A Stimulating Paper

The accompanying paper is presented not alone because it is an able exposition of an exceedingly important marine engine problem, but because a careful reading of Mr. Wentworth's arguments will stimulate the imagination. There may not be entire agreement with the author's conclusions, but nevertheless the basis on which he proposes to proceed is worthy of careful consideration and the paper itself should create valuable discussion.

Experience is Not Everything

If these three assumptions are justifiable, there should be no hesitation on the part of a well-organized engine-designing force to undertake the design of an oil engine to fill a certain requirement. Attempt has been made to emphasize this matter strongly. Experience is a wonderful guide, and the author would be the last to decry its value. However, it seems, in view of the newness of the oil engine as a commercial machine, and in view of the fact that all who are interested in this matter are too apt to be partisan advocates of one type or another, that an engine designed under this method might offer advantages which the product of some exploiting firm would lack. It is claimed that the author is an impartial person. Quite the reverse is true. But it is hoped that this paper may be considered from an engineering viewpoint, each one having the privilege of rejecting those points which reflect the enthusiasm of the author or, rather, of making such allowance for those individual ideas as may seem wise and of considering how the paper as a whole may be used as a guide for such designs. It will be a long time before these matters of type are settled to the satisfaction of all. For this reason it is perfectly proper for the author to present his individual opinions, believing them to be best. At the same time this paper does not depend upon these theories, but is rather an attempt to handle the whole matter on such a basis that changes in this design to eliminate these individual theories would not affect the work of handling the new design in the drafting room. It would simply mean new allowances for changes in method of operation in the engine.

Under the head of general data there are several points to be settled before the design is begun. They are at present largely a matter of judgment. There are apparent reasons for following certain designs. These will be given as they appear to the author. Owing to the newness of the oil engine these claims of supremacy cannot be positively stated as facts, but good reasons can be given for their adoption. The general features to be decided upon before the actual design is begun are as follows:

1.—The type, whether two-cycle or four-cycle.

2.—The pressure of compression, and whether this pressure shall be constant or not.

3.—The class of fuel to be used, and what steps shall be taken to insure its successful use.

4.—The means for starting, and what, if any, steps are needed to make practical the particular type of starting settled upon.

5.—The best arrangement of the air compressor.

6.—The peculiar qualities necessary in fuel valve and fuel pump.

Four-Cycle Type Selected

The type selected was four-cycle and the engine was designed for naval use. The navy needs two speeds; one is a normal economical cruising speed and the other a maximum possible speed, regardless of economy.

The four-cycle is unquestionably superior to the two-cycle because it allows a greater variation. In a four-cycle engine by a simple matter of admission valve control any desired pressure of compression can be

A paper presented at a meeting of the Society of Naval Architects and Marine Engineers, New York.

Generated on 2024-07-26 17:21 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

obtained. This is possible in the two-cycle only by making the normal pressure the low pressure. In other words in the two-cycle the pressure of compression can be varied only by increasing the pressure of the scavenging air. Any regulation of the pressure by a reduction of the scavenging air below the normal would seem to be very difficult to obtain, that is, the normal compression should be that pressure which would result from having a full cylinder of air at atmospheric pressure. It is difficult to see how any pressure lower than this is practical in the two-cycle engine. A higher pressure than this can be obtained by increasing the pressure of the scavenging air.

In the condition of the engine today there are many points which will remain a matter of opinion till settled by exhaustive tests. With a four-cycle engine these points in some instances can be settled by the use of such a type of valve action that the same engine can be run on different cycles or types of indicator cards. From such tests much valuable data could be obtained, and so, if for no other reason, it seems wise to adopt the four-cycle type. Also the matter of simplicity must be considered. Is it simpler to have a given number of cylinders with a more elaborate system of valves in the head or is it better to increase the number of cylinders by adding scavenging cylinders? The author holds that the four-cycle type is the more simple.

Notwithstanding this opinion, considerable attention has been given to the two-cycle type in order to make as many of the author's theories applicable to the two-cycle as is possible. It is hard to see how the weight of the four-cycle type can be reduced by making a two-cycle, and it seems that the simplicity of valve gear is more than offset by complications in the engine as a whole, and also that a great amount of flexibility is sacrificed by adopting the two-cycle type.

Notwithstanding Diesel's theory, the compression pressure in the oil engine is primarily carried to the high point for the purpose of producing a temperature of ignition. The designer should consider this feature very carefully to see if a lower pressure cannot be used with better results.

We know that a pressure of compression of about 500 pounds will give a temperature sufficient to ignite the fuel spray. If this pressure can be reduced, the result will be lower-bearing pressures and reduced strains in the crank shafts. Since this means a lighter and more durable engine, it becomes of vital interest to know just how low a pressure of compression can be used. It has been fixed that from 450 to 500 pounds will be an average figure to use for the conventional type of engine. This pressure can be very greatly reduced by warming the cylinders, by steam for instance, before attempting to start the engine. The estimated pressure of compression will not vary from the actual pressure by any considerable amount. We know that a small four-cycle oil engine, when warm, will fire on a compression of 125 pounds. It is certain that under the same conditions—namely, after the engine has been warmed up by operation—the larger sizes will be able to run on pressures as low as 150 to 175 pounds.

This latitude may be objected to as being altogether too great to be tolerated in a design which is to be built. Just as the main bearings have to be scraped to fit the shaft, so it is possible to fit the cylinders with a proper clearance. This is not a very difficult matter; that is, in case of an error in estimate, no parts need be scrapped. There are several ways in which considerable adjustment can be made in the cylinder clearances. In the original engines put out by the American & British Mfg. Co., the shaft was raised or lowered by means of wedges upon which the bearings rested. This seems to offer a little too much chance for meddling on the part of irresponsible parties, and it is suggested that the connecting rods may be lengthened or shortened to make the needed variation. In addition to this method, it is possible to get the same result by taking a chip from either the head or the cylinder, or a slightly thicker gasket might be used in place of the original gasket. Even this change in the gasket might be objected to, while absolutely no objection can be found to taking a chip from the head or the cylinder in case the engine is found to have too great a clearance and in case the clearance be not large enough to take a chip from the connecting rod. In fact, with a marine type connecting rod, all the variation which is necessary can be made by either lengthening or shortening the rod. This matter of adjustment will not be a serious one, and when the designer understands that his estimated clearance can easily be altered, in case of need, without the waste of any machined parts, greater confidence should exist in his mind in regard to the final product. Having shown how the clearance can easily be altered to suit the needs of the engine, the necessity of wide experience is done away with. The clearance will vary for the different types to be built. For instance, a small high-speed engine will run on a lower compression since the length of time is a minimum during which the compressed air at its maximum temperature is exposed to radiation losses under the worst condition. On the other hand, in a large and slow-speed engine, while the air at the end of the stroke has a longer time in which to lose sufficient heat to prevent ignition, the space in which the air is compressed is much greater and hence the facilities for heat losses are less. It is very probable that there will not be a very great difference in the clearance which can be used. The time element in the high-speed engine is to a very great degree counteracted by the increased clearance of the larger engine.

The data presented in "The Thermodynamics of the Marine Oil Engine" prove conclusively that the full pressure of compression is not needed after the engine has been run long enough to get warmed up. Since

Table I

Comparison of Diesel and Low Pressure Types

Description.	Data	
Engine sizes, inches	12 x 12	60 x 60
Piston area, square inches	113.1	2,377.4
Piston circumference, inches	37.7	188.5
Piston displacement, cubic inches	1,357	172,500
Cylinder contents diesel, cubic inches	1,460	185,500
Cylinder contents, low pressure, cubic inches	1,697	215,500
Length of cylinder diesel, inches	12.91	64.60
Length of cylinder, low pressure, inches	15	75
Clearance volume diesel, cubic inches	103	13,000
Clearance volume low pressure, cubic inches	340	43,000
Clearance surface diesel, square inches	260	6,622
Clearance surface low pressure, square inches	339	8,582
*Wt. of air per stroke, diesel, pounds	0.0508	6.47
*Wt. of air per stroke, low pressure, pounds	0.0592	7.53
Ratio clearance surface, (D:LP)	0.788	0.772
Ratio clearance vol. (diesel low pressure)	0.303	0.303

*Temperature of air at beginning of compression is 200 degrees Fahr. compression pressure diesel 500 pounds; compression pressure low pressure type 135 pounds.

Generated on 2024-07-26 17:21 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

the engine will warm up in a very short time under the fuel cycle, obviously it is important to decide how to bring the engine to a condition of design under which it will not only start but, after starting will be in the most ideal condition for operation under the fuel cycle. The engine built in large units must be jacketed when running on the fuel cycle. Vessels of any considerable displacement must have steam aboard for auxiliary purposes. Under these circumstances the most practical means for meeting this condition is to provide the water jackets with steam pipes, so that steam can be admitted to the cylinder jackets in order to warm the cylinders preparatory to the first explosion. The term "explosion" is used here with a purpose. Combustion and explosion differ chiefly in the time element. The explosion we usually associate with a rising pressure, and it is this rising pressure which is needed in the oil engine. By using steam to heat the cylinders it is possible to produce a card such as is shown in Fig. 7, marked "Ideal Card of the Low-Pressure Type." It is only after the engine cylinders have been warmed in some manner that such a card is possible at the initial stroke. Since only a small amount of steam will be needed to warm the cylinders, it seems highly desirable to install a steam plant for this purpose, even if there be no other use for steam aboard of the vessel.

The ultimate efficiency of the engine is a combination of the thermal and mechanical efficiencies. The thermal efficiency depends upon the number of expansions. The mechanical efficiency depends upon the ratio of the mean effective pressure to the average pressure during the compression and expansion strokes. The thermal efficiency is not reduced by reducing the pressure of compression and increasing the clearance while advancing the fuel injection. Fig. 2 shows two cylinders of the same size, but one is of the low-pressure type and the other of the high-pressure type. Besides the expansions there is the matter of radiation. The greater the clearance the less chance for radiation loss. Table I contains some comparisons to bring this out. Here we see that while the volume of the clearance of the diesel or high-pressure type is but 30 per cent of the same volume for the low-pressure type, the surface of the diesel clearance is about 78 per cent of the surface of the low-pressure type. This shows how the opportunity for radiation losses is much greater in the high-pressure type.

Before considering the mechanical efficiency it is quite important to understand the effect produced upon the power by the reduced compression. Referring again to Fig. 2, we find the relative volumes of air compressed per stroke in the two types of engines. For convenience the two engines were taken as each being 12 inches bore and 12 inches stroke. It is suggeested as desirable to place a blower on the intake pipe in order to improve the scavenging. Assuming perfect scavenging, the volume in the low-pressure type at the end of the suction stroke will be 0.91 cubic feet against a corresponding volume of 0.85 cubic feet for the high-pressure type owing to the fact that the low-pressure type has a greater clearance.

In order to be a commercial success the oil engine must not only have the efficiency but also the power. This point is a strong one in favor of the low-pressure type. The full overload condition of the engine means that the maximum amount of fuel must be used. The maximum amount of fuel depends upon the amount of air which can be compressed per stroke. Here we have about 7 per cent more in the cylinder of the low-pressure type than in the high-pressure type of the same bore and stroke. It is obvious that the amount of fuel which we can use will be 7 per cent greater in the low-pressure than in the high-pressure type. Against this argument it can be said that in order to produce the same ignition temperature in the low-pressure type as is produced in the high-pressure type, the air in the low-pressure type must be hotter than is the case with the high-pressure type and hence the weight of air will thus be reduced. The argument is a

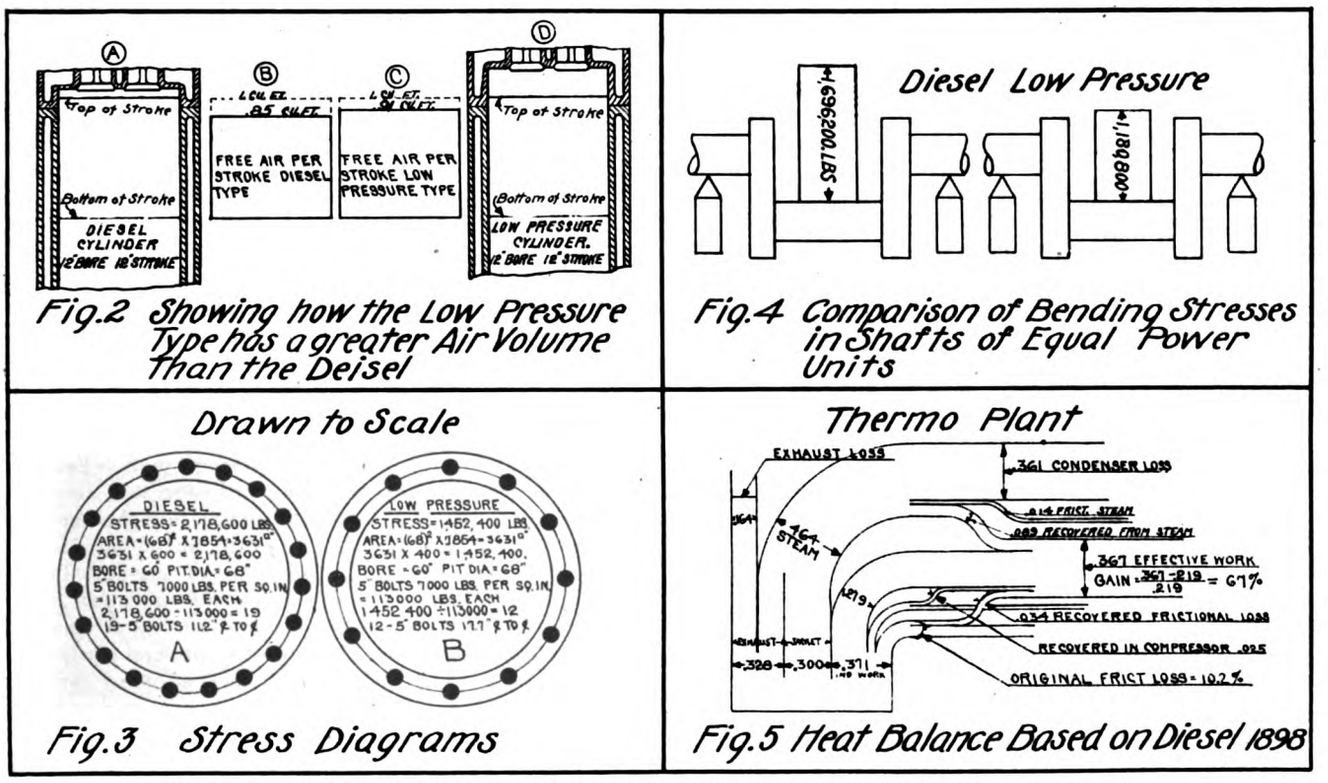


Fig.2 Showing how the Low Pressure Type has a greater Air Volume Than the Deisel

Fig.4 Comparison of Bending Stresses in Shafts of Equal Power Units

Fig.3 Stress Diagrams

Fig.5 Heat Balance Based on Diesel 1898

FIGS. 2, 3, 4 AND 5—DIAGRAMS ILLUSTRATING EFFECT OF HIGH AND LOW COMPRESSION

Generated on 2024-07-26 17:21 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

good one and must be considered. The answer is that in the high-pressure type the air is cooler than in the low-pressure type only in the beginning of the operation of the engine. It has been shown how, as the high-pressure type is warmed up, the air at the beginning of compression is much above the normal room or atmospheric temperature and the final temperature at the end of compression is much above that needed for ignition of the fuel. For this reason the comparison by weight of the air compressed in the two types of engines will not vary appreciably from the comparison by volume. This being so, the amount of fuel used per stroke in the low-pressure type will be about 7 per cent more than is possible in the high compared on a basis of piston displacement.

Mechanical Efficiency

The mechanical efficiency of the engine is the ratio of the brake horsepower over the indicated horsepower. The brake horsepower is the indicated horsepower minus the frictional loss. The frictional loss is a function of the pressure on the bearings and also certain losses in the auxiliaries. As far as the bearing losses are concerned or the main engine friction, this is largely a function of the sum of the average pressure for the compression as well as for the expansion strokes. Without going into a detailed calculation it is evident that the sum of these two average pressures will be less in the low-pressure type than in the high.

For this reason it would appear that the low-pressure type has a greater power for the same piston displacement with an equal thermal efficiency and a greater mechanical efficiency. This seems to be the ideal condition sought for in the oil engine. It means a more powerful engine and at the same time reduced bearing pressures and stresses which will be reason for expecting a longer life and reduced upkeep.

Here is the proper place to take up the matter of the injection air. In the high-pressured type of engine about 10 per cent of the net brake horsepower is consumed in the air compressor. Because of the pressures in the low-pressure type, the air for injection purposes can be reduced in pressure, which will reduce the loss in the air compressor, which in turn will give an additional gain in the efficiency of this type of engine.

For the marine engine, and especially for the naval engine, speed variation is a most important feature. It is here that admission valve control comes in. In all present oil engines the speed is controlled by a variation of the fuel fed per stroke. This means that at reduced power the engine compresses an unnecessarily large amount of air per stroke. Unnecessary work means mechanical loss. For this reason it is proposed to reduce the amount of air compressed per stroke as we reduce the amount of fuel used per stroke. Under the Diesel school theories this is impossible. It has, however, been proven possible to a certain degree by the experiments of the author. The result is that no unnecessary frictional loss is occasioned by the compression of an unnecessarily large amount of air.

There is a theoretical gain in the low-power cycle which is independent of the mechanical gain. In the internal-combustion engine the pressure at the opening of the exhaust passages is still very high—from 20 to 30 pounds. Suppose we could collect this high-pressure working fluid and expand it in a secondary cylinder without loss from back pressure. This would result in an additional saving of a very considerable amount. On the proposed cycle this is accomplished. Let us assume that the admission valve is closed at two-thirds of the suction stroke. Then when two-thirds of the expansion stroke is completed a normal cycle is closed. On the low-power cycle the expansion is continued 50 per cent further before the charge is exhausted. In this way the efficiency of the low-power cycle is greatly increased.

Besides this condition of economical low speed there comes the condition of extreme low speed which is only occasionally needed. Here economy is not a factor. The engine must run slow regardless of economy. The limit in low speed comes from the loss of ignition temperature due to radiation. This can be overcome to a degree by controling the circulation of the cooling water. As the engine slows down the work done per stroke is reduced and consequently the heat which must be carried off is reduced. So far as is known the author is the first student of the internal-combustion engine to suggest attaining a lower speed through a regulation of the temperature of the cooling water. This seems, however, to be important. There will never be a call for a prolonged operation at extreme low speed. In such cases as picking up a disabled ship at sea, or in similar emergencies, it is most important to be able to regulate the amount of cooling water fed to the jackets in order that the excessive radiation losses may be avoided. The means for accomplishing this result seem to be practical and to follow the commonly accepted laws of thermodynamics, which apply to the oil engine as well as to the steam plant.

The oil engine has come to stay, and as the number of engines increases the inevitable result will be a rise in the price of the available fuel. The oil-producing interests have so far met the oil engine rather more than half way. There are fuels on the market known as "Diesel engine oils". These fuels are, if the author is not misinformed, distillates, that is, the refuse from the production of lighter oils is heated to a temperature above that at which the kerosene is evaporated and the resulting vapor is condensed. This gives a fuel which is fairly fluid, and which in a way is a by-product. Gasoline was originally a by-product and, like gasoline a few years ago, this fuel is at present very reasonable in price. It is not safe or wise to depend upon this condition continuing. The oil engine is doomed to be extremely limited in its application if this fuel is depended upon.

Fuel Must Flow Freely

The fact that this fuel is a volatile product like gasoline, although vaporizing at a much higher temperature, is of no importance to the oil engine. All that is needed for the oil engine is a free flowing fuel. Even the presence of a considerable amount of non-volatile matter like the asphaltum residue seems to be of no disadvantage in this type of engine. The one essential is that the fuel must be free flowing. In this one great point, Dr. Diesel stood out pre-eminently ahead of his time. He went so far as to propose the use of coal in a pulverized form in his engine. While the use of coal in the engine is of very doubtful value, the use of all grades of fuel oil is unquestionably practical. How to utilize these low grade fuels is very important.

We buy fuel by bulk, and it is practically true that all fuel oils have the same calorific value. The point to be considered is that when a heavy fuel is bought by bulk, although the calorific value per pound is somewhat less than for a high-grade fuel, the calorific value per gallon is greater. Since we buy fuel by the gallon this is what interests us.

Again, in order to protect the development of the engine against being checked by the rising price of fuel oil, it is very essential to be able to use the same fuels as are used under the steam boilers. If this be done, since the oil engine has an efficiency of not far from three times that of the steam engine, the steam engine can be driven back to the use of coal before the oil engine can be

Generated on 2024-07-26 17:21 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

seriously affected by the rise in the price of fuel.

Having shown the extreme desirability of the use of this low-grade fuel, next in order is the study of means for using it with good results. There seems to be one means which has already been proven in the steam plants, that is, to heat the slow-flowing fuels before feeding to the fuel pumps and fuel valves, and to do away with the jackets on the fuel valves while changing the design of the valves so that this can be done without serious trouble. As far as the operation of the engine is concerned, excuse for a water jacket on the fuel valve is to protect combustion in the fuel valve. This can be prevented by a change in the design of the fuel valve, and better results will be had from this new type of valve.

In suggesting anything new in an engineering line the reason must be looked for to explain why this has not been done before. It is not safe to say that a reason does exist. Only too often the new idea has never been tried on account of a lack of inventive or imaginative ability rather than on account of too great an understanding of the obstacles confronting the designer. In this case there seems to be no obstacle in the way of building a universal oil engine. By this term is meant an engine which will use all grades of fuel without changing any of the parts of the engine.

For instance, it might be possible to design an engine with several interchangeable fuel valves, so that as the type of fuel was changed a suitable type of valve would be available. This does not seem desirable or necessary. By controling the application of heat to the fuel it seems very reasonable to believe that any grade of fuel will be satisfactory, and the only mechanical problem will be to design a fuel pump to handle the fuel and a fuel valve to produce the spray.

In his experimental engine the author had means for pumping up a fuel pressure, by moving the block, which carried the lower end of the pump connecting rod, along a slide oscillated by an eccentric. When the engine was at rest, by moving this block from the position of no motion to the position of full stroke of the pump, a movement of the pump plunger did not produce as good results as a very quick and sharp motion. This suggested that more ideal conditions could be obtained by designing a pump in which the fuel would be delivered by a blow on the plunger like that which would be given by the impact of a hammer. The only practical reason for this is that such a blow will start the check valves better. In a way the check valve is moved by the stream of fluid in the pipes, and the more rapid the motion of the fluid the more perfect is the action of the valves. No doubt the trouble which the author experienced was due to imperfect mechanical details, but if this modification will enable a more imperfect construction to produce the desired result it cannot be out of place in a perfect mechanical device.

Besides the advantage in the action of the check valves resulting from this design, there is a further gain. This gain is shown by Fig. 6. In spraying a heavy oil from the present type of fuel valves considerable difficulty seems to be encountered from the fact that the fuel is delivered to a fuel-receiving chamber and then

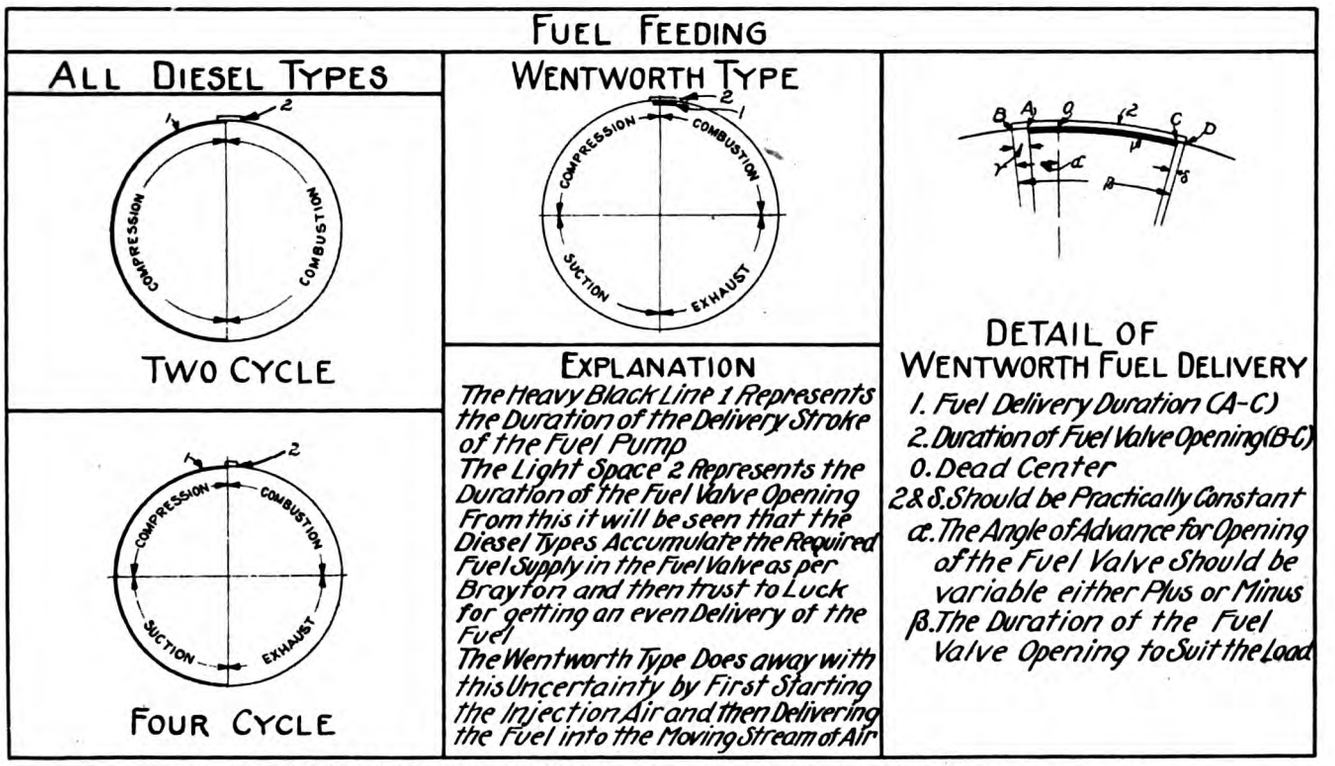

FUEL FEEDING
ALL DIESEL TYPES
COMPRESSION
COMBUSTION
TWO CYCLE
COMPRESSION
COMBUSTION
SUCTION
EXHAUST
FOUR CYCLE
WENTWORTH TYPE
COMPRESSION
COMBUSTION
SUCTION
EXHAUST
EXPLANATION
The Heavy Black Line 1 Represents the Duration of the Delivery Stroke of the Fuel Pump
The Light Space 2 Represents the Duration of the Fuel Valve Opening
From this it will be seen that the Diesel Types Accumulate the Required Fuel Supply in the Fuel Valve as per Brayton and then trust to Luck for getting an even Delivery of the Fuel
The Wentworth Type Does away with this Uncertainty by First Starting the Injection Air and then Delivering the Fuel into the Moving Stream of Air
DETAIL OF WENTWORTH FUEL DELIVERY
1. Fuel Delivery Duration (A-C)
2. Duration of Fuel Valve Opening (B-C)
0. Dead Center
2 & 0. Should be Practically Constant
α. The Angle of Advance for Opening of the Fuel Valve Should be variable either Plus or Minus
β. The Duration of the Fuel Valve Opening to Suit the Load

FIG. 6—DIAGRAMMATIC REPRESENTATION OF DIFFERENT METHODS OF FUEL FEEDING

the heavy fuel, when thus treated, is in every way the equal of the gas oil. For this reason it becomes of the utmost importance that the treatment of the fuel, preparatory to spraying, be studied with the utmost care.

For all practical purposes it can be stated that the Baume of asphaltum base fuels will increase one degree for each increase of 15 degrees Fahr. in temperature. With this change in Baume there is also a change in viscosity. This change is needed to make extreme low grades of fuel oil available. It will not be sufficient to simply heat the fuel oil; it must be kept hot till after the oil spray is formed. This means that the water jacket must be omitted from the design of the fuel valve, a step which has already been adopted by some engine builders. The only

Generated on 2024-07-26 17:21 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

picked up from this chamber by means of the injection air. With a light fluid fuel this difficulty is not noticed. As the oil becomes more heavy and sluggish this difficulty increases. The sheet referred to explains the situation. In the first two figures the heavy black line shows the duration of the delivery stroke of the fuel pump. This would be for full stroke or the full-power condition. The short, light space at the top shows the duration of the opening of the fuel valve into the cylinder. From this it becomes at once evident that the fuel is delivered to the fuel valve and there comes to rest. From this position of rest it must be again put in motion and torn apart by the action of the injection air. There is a certain inertia to the oil and this inertia is greatly augmented in the case where the fuel has a high viscosity. This type of fuel valve is that proposed by Geo. B. Brayton and patented by him. In these figures the time of a complete cycle of the engine is shown by the full circle of 360 degrees. The various events of the cycle are shown in the figures. The next figure shows the method which is proposed by the author. As will be seen in the consideration of the fuel pump, the two strokes of the pump are of short duration and the rest of the time the pump is idle. The theory of this method of fuel injection is to coordinate the operation of the fuel valve and the fuel pump so that the fuel valve will open, starting a stream of injection air into the cylinder, and at the same time the discharge from the fuel pump will take place, delivering the fuel charge directly into the stream of moving air where it will be broken up and delivered into the cylinder in the form of a suitable spray. By this method one of the obstacles to heavy fuel will be overcome. From the time the pump begins to deliver its charge the fuel will not be allowed to come to rest. In this way the fuel valve can be simplified in its design and the question of a delicate proportioning of parts to suit a special type of fuel will be done away with. It will be possible with a little experience to vary the pressure of the injection air, giving an additional saving. This, however, will be a matter of adjustment possible while the engine is in operation. Even if this be ignored, the gain through the use of heavy fuel, not practical in the present types of fuel-feeding arrangements, will be made without any counteracting loss. The fuel valve of this arrangement consists simply of two passages, each controled by a separate needle valve. These valves are worked from one tappet rod and the air valve must be opened first, with the opening of the fuel valve being timed to the delivery of the fuel by the pump. In this way a stream of air will be started and the oil delivered into this air, and then the air will continue to flow for a short time after the delivery of the fuel in order to clean the passage to the cylinder so that the valve may not be clogged.

The fourth figure is an enlargement of the fuel and air delivery events. The duration of the opening of the valves and of the pump strokes can be controled as well as the timing of those events. At first thought this seems to be quite a complication but on closer observation this complication is shown to be nothing but what exists in every automobile engine. Certainly, if it is advisable to vary the timing of the spark on an automobile engine for the sake of speed control, it is not out of place to contemplate a similar modification in an expensive plant where the efficiency gain will be a great factor. Again we have several elements here. It would be impractical to have the elements all under individual control. It will be possible, however, to have a connection between the fuel-pump control and the fuel-valve control so that one lever will regulate all. This would be similar in idea to the present method of changing the cut-off on all cylinders of a compound steam engine from one lever, and at the same time with a provision for varying the cut-off of the separate cylinders at will.

This is the first thing to be done with the engine and has been the last to receive consideration. The reason is that the time under the starting cycle is very short, and a matter of efficiency is not worth considering. By efficiency is meant the thermal efficiency. It is a matter of efficiency whether the engine will start or not. It becomes a matter of efficiency if it be shown how the engine can be run for an appreciable time on the energy which can be stored in a compact form available for instantaneous use. This is a matter of practical utility rather than of thermal efficiency. That the matter of thermal efficiency does come into this consideration is only incidental.

The steam engine starts with an expansion stroke and has steam available for this stroke, so the starting feature is not a factor. In the internal-combustion engine the starting problem is a most difficult one. Not alone does the engine have to be accelerated but the acceleration has to impart sufficient energy to overcome inertia, do the work of the engine and at the same time produce the compression stroke.

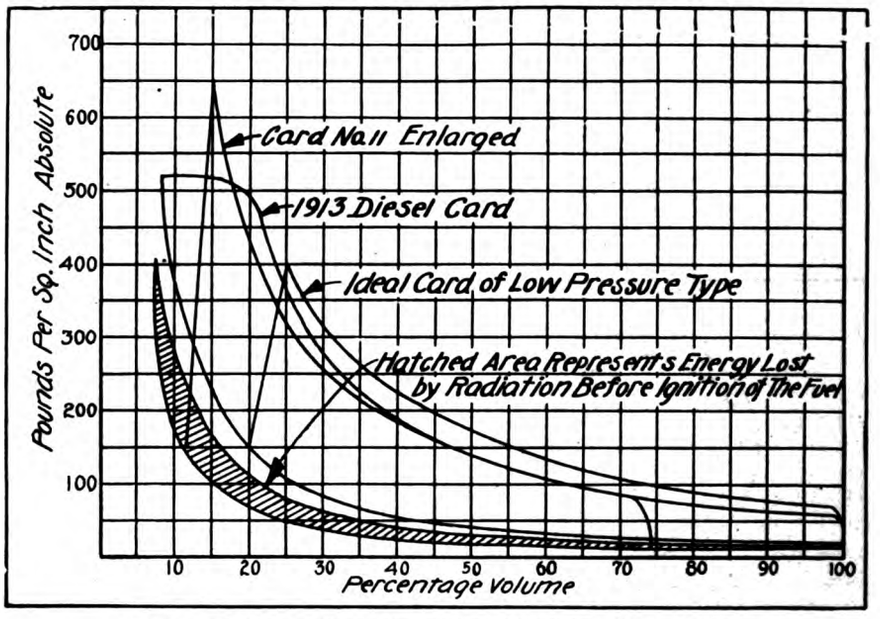


FIG. 7—IDEAL CARD FOR LOW PRESSURE TYPE ENGINE

Up to the present compressed air has been universally used for this purpose. The oil engine is still in its swaddling clothes and many developments must be worked out before the engine can take its place in the world's work as a tried and reliable element. For the generation of heat on shipboard the use of steam is practically essential. Then it is recognized that air starting is not absolutely reliable, for air must be generated. This may be done by a small oil engine. The auxiliary plant in turn must be started by air. This condition has brought about the use of a

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

small steam-driven air compressor, or an electric air compressor, supplied with current from a turbo-generator set driven by steam. This is mentioned to show that even now it is realized that steam, either directly or indirectly, is a reliable means of starting the oil engine. This being the case, why not abandon the use of air altogether and start directly from steam?

As to cost, the air for starting is used for starting alone and so there is a direct expense chargeable to starting alone. On the other hand, the water container can be used as an auxiliary boiler for steam-operated auxiliaries. Hence this element cannot be properly charged to the cost of starting the engine.

As to reliability, there is no argument. Steam has proven its reliability, and the only advantage of the oil engine is its economy. The disadvantage of the oil engine is its lack of reliability and a certain feeling of doubt which exists with all new elements. The matter of unreliability can be done away with by the use of steam as outlined. There is no limit to the slowness with which the oil engine can run. Suppose it necessary to run below this limit, can air be depended upon? Apparently not. When the engine is running slow no great amount of power is generated, and this condition will not be needed for any length of time. The chief need of this extreme slow speed would seem to be in picking up a tow at sea or in making dock. In maneuvering to make dock there have been several instances where the air has given out and the navigator has had to stand by and watch his vessel strike in a way which must be particularly annoying to a good navigator. This feeling of uncertainty as to the condition of the air supply must do much to make the oil engine unpopular with the bridge force. On the other hand the use of steam drawn from the auxiliary boiler would do away with all this, and the navigator need not know but that his engine is a steam engine. He can come within maneuvering distance of the dock and then go on to the maneuvering cycle and bring his vessel up to the pier with absolute assurance. In order to make this possible in the oil engine it is necessary only to provide the engine with means for jacketing the cylinders with live steam. In fact, for the last case considered—that is, of maneuvering to come to a dock—it will be necessary only to cut out the cooling water and to depend upon the heat of the cylinder walls to prevent undue condensation. This is not a condition which need offer much difficulty, as the engine will simply follow the practice of the present steam engine.

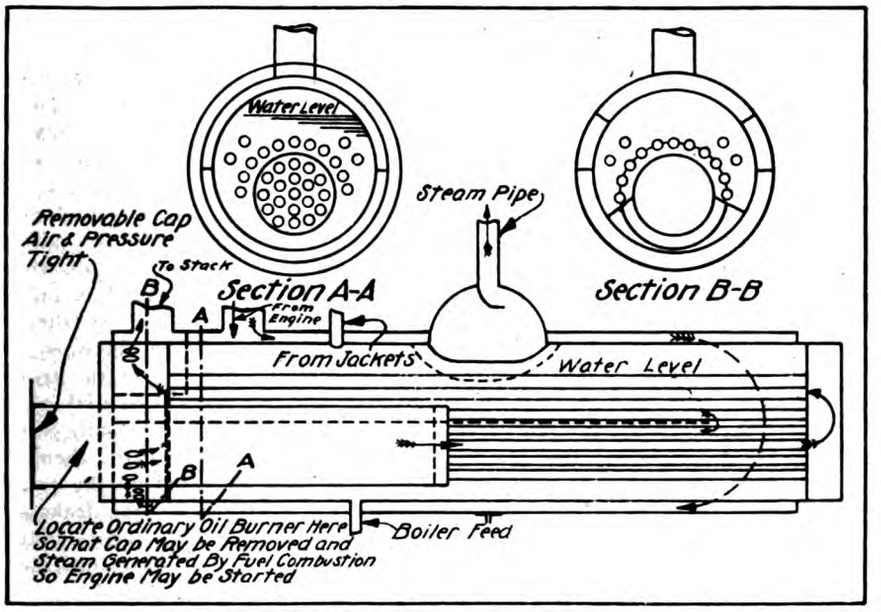


FIG. 8—SKETCH OF ECONOMIZING BOILER

The whole idea of this design is to reconcile the peculiarities of the oil engine to that thermodynamic practice which has been found to be best in the use of the steam engine. The cylinder walls of the engine are jacketed, not to make them cold, but rather to prevent them from becoming too hot. It seems to be a necessary line of development to study this matter of temperature of the engine and to see that the engine be not reduced in temperature below that point which is desirable, just as in the steam engine the point of the best practical vacuum becomes a matter of judgment and not a case of obtaining the greatest possible vacuum regardless of cost.

In presenting this design no attempt is made to claim perfection. The aim has been to present a design which will be a basis for improvement. It is felt, however, that to submit general ideas without presenting working plans is apt to leave the reader in doubt as to how the general scheme will work out. If this design starts thought and discussion it will not fail of its purpose. It is felt by the author that the design submitted is superior to any of which he is aware. At the same time it is fully recognized that with so much detail as is found in such a design, many of the minor details can be wisely criticized. It is felt that such can be improved upon without altering the type of the engine.

The Actual Design Submitted

The general ideas have been presented first, in order to make clear the aim of this type of engine. This design is a four-cycle type, but many of the principles involved can be applied to a two-cycle type, although the four-cycle is favored by the author. If the elements taken up are found to be sound, the practical application of these elements to a design of different size and use will be a matter of application of recognized principles rather than a matter of design along new lines. It has been hoped that it would be possible to make it perfectly clear that an oil engine can be designed in the same manner as a steam engine, and that it is not necessary to buy experience from foreign manufacturers.

It has been hoped that this paper would bring out the fact that the oil engine field is still an open field in which much remains to be done, and that these results can be as well obtained by an organization which starts out to design its engine according to needs, in place of buying and remodeling an unsuitable design. It is felt that, if the oil engine is to be built, one of two courses must be followed. The first is to buy from some manufacturer a design which absolutely suits, and to build without modification. The second is to thoroughly understand the principles of the oil engine and then to design the engine to suit. It is felt that no perfect engine exists today and so it is far safer for the manufacturer to realize this condition and absolutely depend upon his own design. The point is, if the original design is to be altered at all, who shall say what shall be taken and what shall be rejected? Does it not seem wiser to pass upon every element by itself,

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

judged by the best which is known? It has been the aim, so far as possible, to collect and present these known elements which are peculiar to the oil engine.

The Design in Detail

This design was to fill the following conditions:

Brake horsepower in one engine	450
Revolutions	450
Length overall not to exceed, feet and inches	14-9
Width not to exceed, feet and inches	3-8
Height above center of shaft not to exceed, feet	6-0
Distance below center of shaft not to exceed, inches	23
Weight not to exceed, pounds	26,000

It is thought that all the conditions can be met or exceeded in this design. To meet the conditions a 6-cylinder design was fixed upon, with cylinders of 13-inch bore and 12-inch stroke. This gives a piston speed of 900 feet at the desired speed, and it is thought from data in hand that the power can be slightly exceeded.

The weights which have been figured out from the details are about as follows:

	Pounds.
Bed plate	3,840
Crank case	2,830
Cylinders	2,200
Heads	1,500
Pistons	960
Wrist pins	195
Connecting rods	1,166
Main bearings	1,310
Shaft	970
Cam shaft bearings	528
Total	18,219

The air compressor is not included, nor the piping. The weight has been figured out to show that the engine comes somewhere near to the limiting figure. On the other hand, the brake horsepower was set for 450. Allowing 90 for the correct effective pressure on the pistons to give the brake horsepower, the calculations for brake horsepower will be as follows:

$$\frac{132.7 \times 90 \times 900 \times 6}{33{,}000 \times 4} = 496 \text{ B. H. P.}$$

132.7 is piston area in square inches.
90.0 is the M. E. P. factor.
900.0 is the piston speed.
6.0 is the number of pistons.
33,000.0 is the foot-pounds per horsepower per minute.
4.0 is the divisor to account for the four-cycle type.

It is expected that this design will be severely criticized. It is, however, felt that this design can be defended upon all lines of attack. The first serious criticism will perhaps be on this factor of 90 in the power calculation. The normal practice is a mean effective pressure of about 100 and a mechanical efficiency of 75. This will give a factor of 75. This factor of 90 is used because the mean effective pressure will be increased on account of a lowered pressure of compression, and the mechanical efficiency will be raised for the same reason. It is felt that a mean effective pressure of over 120 and a mechanical efficiency of over 80 would be perfectly reasonable. This increase in mean effective pressure and in the mechanical efficiency will be explained somewhat by Figs. 2, 3, 4, 5 and 7.

The first question to be settled in the design of an oil engine should be what pressure of compression shall be selected for the full-compression pressure. The writer is intolerant of restraint. The oil engines in use today have jacketed heads and use a pressure of compression of 500 pounds. This is used because Dr. Diesel used it. Dr. Diesel took the suggestion of du Rochas and made it practical by fixing the presure of compression. How he arrived at this is unknown. Too great credit cannot be given to Dr. Diesel for his progressive spirit. Too great condemnation cannot be given to his imitators who, without additional data on hand, still copy the cycle which Diesel hit upon as a result of his groping around in the dark. In this submarine engine the compression at full load was fixed at 200 pounds. The clearance was found to be 15.6 per cent and the height of the clearance to be 2¼ inches. This design was worked out, not alone to illustrate to the navy department certain ideas in oil engine construction, but also along lines upon which the author was willing to stake his reputation. In order to start this engine, steam would have to be supplied to the water jackets. This is undesirable for such a small engine, but the submarine of today is not the submarine of tomorrow. When the offer was made to design a submarine engine reference was made to such an engine as would be needed in the large ocean-going submarines in which a speed of 25 knots would be obtained. These submarines have been designed and the speed reduced to 19 knots because of the inability to obtain the higher speed. To produce steam needed to warm this engine will not present any great difficulty, and the engine will be greatly improved by an increase in power and an increase in mechanical efficiency. As soon as the engine is firing, water will be needed in the jackets and the engine will then follow the conventional diesel in its cycle.

Extreme emphasis has been laid on the fact that this design is not claimed to be mechanically perfect. If put into the hands of a first-class drafting force and the several details gone over with great care, the result would be a great improvement. But the contention is made that the designer should keep his hands off the general arrangement.

The general arrangement will be a good place from which to begin a consideration of the engine as a whole. No air compressor is shown because it is felt to be very bad practice to couple the air compressor to the main shaft as it is too often done.

Let us assume that the air compressor be coupled to the main shaft of the engine. In such an arrangement a fixed amount of air is handled by the compressor for each revolution. This arrangement is used when air is used for starting the engine. The result is that the amount of air which should be compressed is a varying quantity. After the starting cycle is completed the air consumed for starting must be replaced. To meet this condition the capacity of the compressor must be in excess of that needed for normal operation. If the engine is run a long time without a starting cycle, then obviously an undue amount of work will be done in the compressor. If the air compressor be a separate auxiliary plant, then this variation in air supply can be handled without any excess of high-pressure air being accumulated. Again, let us assume that the valves of the compressor are not working properly and that the vessel is on a run. If the compressor is direct coupled, all that can be done is to stop the engine and correct the trouble. It may be very essential that this be not done. If the air compressor be a separate plant, then it will be possible to speed up the compressor to make up for the leakage, and the vessel can be kept under way. The loss in the air compressor will be appreciable, but this loss will be far less than that caused by stopping the vessel. This explains the reason for not having the air compressor direct coupled to the main shaft.

The engine is divided into two sections of three cylinders each with the couplings, reverse gear and fuel pump placed between the two sets of cylinders. It is felt that by this arrangement the stresses in the cam shafts will be reduced below that of the arrangement where the cam shafts are driven from one end. There is space available due to this arrangement for placing the fuel pump between the two sets of cylinders. It has been stated that the fuel and the admission valves must be subject to regulation as to timing, etc. The starting and exhaust valves do not need this regulation. For this reason the fuel and exhaust valves are placed on the front side of the engine and the starting and admission valves on the back side. It is practical to vary but one set of valves from one cam

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

shaft. Therefore the proposed arrangement. The cam shaft as designed is composed of a shaft and a sleeve. The drive is on the sleeve and the fixed valve is driven from the sleeve. The shaft which is within the sleeve can be varied in its position relative to the sleeve. The cams for the variable acting valves are operated from the shaft within the sleeve. This means that at one side the fuel valve is operated from the shaft and the exhaust valve from the sleeve, while on the other side the starting valve is operated from the sleeve and the admission valve from the shaft. No defense will be offered for this mechanical arrangement. It was worked out after years of scheming and perhaps a better arrangement can be produced to get the same result. This result must be obtained, however. The drive from the sleeve to the shaft is composed of a spiral key and keyway similar to that used in the side-shaft steam engine for reversing. The timing of these valves is regulated by the levers shown at the end of the cam boxes. It is claimed that this device is a working and practical arrangement. Nothing more is claimed for it.

Reversing the Engine

The motor ships run by four-cycle engines are for the most part reversed by swinging the cams clear of the cam shafts while the cams are being moved along the cam shafts. This is needed for a multi-cylinder engine, because otherwise one or another set of cams would always be prevented from moving by coming in contact with its roller. This difficulty is remedied in the motor ship, as has been stated, by swinging all rollers clear of the cams during a change of cycle. For a compact engine this arrangement is rather clumsy. The same result obtained by this swinging movement must be obtained. In this engine it is obtained by a modification of the roller and roller fork. The rollers are carried on a long pin with considerable play on each side of the rollers. The rollers are held in a central position by means of balanced springs. With this design, in changing from one cycle to another, those cams which interfere with a roller will simply push the interfering roller to one side and the other cams are not prevented from attaining their new position. The displaced rollers take their normal position as soon as the cams have rotated enough to allow this action. In making the change from one cycle to another in a 6-cylinder engine there will be normally 24 cams bearing on the cam surfaces. These cam rollers must be held down by strong springs in order to assure prompt action of the valves at high speeds. To move the cams along the cam shaft would naturally call for the expenditure of considerable effort. In order to make this action easier and the maneuvering of the engine more prompt a provision is made on the cam boxes whereby all cam rollers may be simultaneously lifted about 1/32-inch. This will be enough to take the pressure off the cams and yet not enough to interfere with the valve action.

The start of this engine is obtained by this same lever. The tappet rod which operates the starting valve is lifted by a further motion of this same lever which will open all the starting valves. This sets the engine in operation, and the valve timing determines the proper direction of rotation. This is done by having a longer and different shaped cam acting on the starting valve tappet. This would be wasteful of starting energy, but the waste will not be excessive and the desired effect will be an instantaneous response to the reverse lever.

The desired operation of the admission valve is obtained by means for varying the timing of the admission valve cam and by making the valve automatic as far as opening is concerned, and mechanically operated as far as closing is concerned. This is done by having the valve cam simply release the admission valve. When this is done the valve stays open as long as the suction stroke is in progress. A partial suction stroke may be obtained by advancing the admission valve cam. In this way the valve opens but not until the suction stroke of the piston begins. On the other hand, when the valve cam completes its operation the tappet rod falls and closes the admission valve. The author is of the opinion that no novelty exists in this method of operation.

Fuel and Fuel Feed

If we divide the method of fuel feeding into two classes we shall have the present class and the proposed class. We may call these two classes the diesel type and the Wentworth type. As far as the author knows he is the first to propose this modification. Fig. 6 shows this difference. In the diesel engine the operation of the fuel pump is slow. The plunger is practically moving all the time, but the stroke is so short that the speed of the plunger is very slow. The author has found by actual experience that a fast-moving plunger will give better results than this slow-moving plunger. The feature of the pump is a floating piston. This piston or plunger is lifted in the delivery stroke by a lever operated by a cam. The plunger is returned by the springs at the bottom of the plunger. The plunger is at all times kept against the lever by means of the spring. The motion of the lever determines the stroke of the plunger, and the movement of the lever is controled by an eccentric shaft. With full eccentricity of the shaft up the lever is held so that the cams clear and no fuel is delivered. With the shaft turned an angle of 180 degrees the maximum stroke of the plunger is obtained. Any desired position may be obtained for the shaft between these two extreme positions and so the amount of fuel delivered may thus be governed. The feature of this pump is not only to deliver exactly the fuel required, but to deliver this particular amount and at just the moment it is needed. By varying the position of this set of cams the action of the fuel pump may have a different timing. In place of a long suction and delivery stroke the two strokes are very sharp and quick, the plunger being idle the rest of the time.

Double Valve for Fuel

Now referring to the plan of the fuel valve it will be seen that this valve really is a double valve. The air for injection has one seat and the fuel comes through another seat. The lift of the fuel plunger should be timed to act with the opening of these two valves so that the fuel will be delivered by the pump directly into a stream of moving injection air. In this way the system can take care of any grade whatever of fuel. It has been pointed out that the trouble with most fuel valves is that the fuel is delivered to the fuel valve and allowed to come to rest, and then the air has to get in and around the fuel so as to deliver it in small portions and not as a whole. This design of fuel valve absolutely does away with any difficulty along this line.

Objection may be made to the care needed in timing the two elements—the fuel pump and the fuel valve. No reply is needed to such an argument. It is no more difficult than to time the spark on a gas engine. Another feature of the fuel valve is that the fuel starts after the air has started, and stops while the air valve is still open. The result is that the fuel valve should give no trouble with clogging—it is cleaned by air after each delivery stroke.

Attention is called to the fuel heating tank. Here the fuel is heated by

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

means of a coil of steam pipes within a tank. By this means a heavy, sluggishly moving fuel may be made to flow as freely as the present gas oil. The result is a saving of 50 per cent in cost. With the particular type of fuel valve shown, no trouble should be experienced in getting this fuel too hot, beyond gasifying it, which would give an unequal action of the engine if carried to excess.

All engines at present used in the United States submarines are said to use this comparatively high-priced gas oil. The engines shown in this design will run from the start on any grade of fuel, and it is thought that no other design of marine oil engine will do this. The author is pleased to state that an engine has actually been operated in this manner on low-grade California oil.

Starting With Steam

There seems to be little question about the advantage of steam in connection with the oil engine. At least the author has studied the matter from all viewpoints and can find no fault with the use of steam. Under these circumstances it is no more than right that some consideration be given to the type of steam generator which would give satisfaction in this service.

The steam generator must have a large water body. There is one disadvantage to this—that it will take a considerable time to get this water body up to the desired temperature. This is true, but we are not handling a toy or quick-acting device. This type of engine is designed for actual service conditions seven days in the week. By this is meant that the engine is designed to be kept ready for use seven days in the week, even if used but once a month. While it would take a long time to get this water body up to temperature it would take but little energy to keep it there. For the navy this means that the watch on duty should see that this steam pressure be kept up. The fuel expenditure will be small.

The probable change in the submarine will be to enlarge it to fit it for duty as a commerce destroyer on the high seas. For men to work at their best they must be kept reasonably comfortable. This does not mean to live in cold, damp quarters. The vessel must be kept heated and the auxiliaries run from the waste heat energy of the present-day engine. It is strange that this had not been taken up before, but because it has not been is no reason for further delay.

The steam generator consists of a furnace with an air-tight door. When the ship is going into commission, or the boiler is being cut in, this door will be open and the steam pressure is generated by the combustion of fuel in this furnace. After the engine has been started, the exhaust from the engine should enter the outer casing of the boiler at the top and go around this casing till it enters the furnace, where the gases would follow the natural course of gases in a boiler and leave to go up the stack. Like other features in this design, no doubt better designed boilers can be worked up. The design of boiler is given to show one practical arrangement. The aim is to get a large water body so that a very great amount of energy can be given off for a very short time. This means that if we use this boiler under the combustion of fuel alone it might be able to generate, say 25 horsepower. For the time needed on the starting cycle it is easily possible to generate from 500 to 2,500 horsepower according to the design.

Naval vs. Commercial Engines

There are two types of engines to be considered in taking up the oil engine broadly. They are the commercial engine and the naval engine. Either of these two types may be highly successful in the field for which it is designed and yet leave much to be asked for in the other field. The naval engine should have a great reserve of power, while the commercial engine should have endurance so that it may run at full power all the time and still have a small upkeep charge. The general qualifications for the two types would seem to be somewhat as follows:

Naval Engine.—In the naval engine it is desirable to have a higher pressure of compression at full loads and a greater variation in pressures of compression. In this type the partial compression cycle would give higher efficiency at partial loads. At the same time this engine should not be designed for the present full-load pressure of compression.

Commercial Engine.—This type would vary from the naval type in that the pressure of compression would be a minimum. The engine should be designed with as perfect a scavenging arrangement as possible and the normal operation of the engine would be full power.

It may be seen that an engine designed under these conditions for one service would not be the ideal engine for the other service. The object of this paper is to give data so that an engine may be designed from these theories to fit the particular needs of the vessel in which it is to be installed. In 1904 when the author began this work it was not intended to work along a stock design which would fit all cases. This is the method which should be followed if the oil engine be a mechanical device which is not capable of being developed along scientific lines. It is hoped that this paper has made it clear that the oil engine has a theory behind it which is even more complex than the theory behind the steam engine, and that to get the best there is in the oil engine particular attention must be paid to the service for which the engine is designed.

Experiments Needed

If this paper has not failed, it should be possible for the designer to take the data and suggestions contained in it and in a preceding paper by the author and develop a design to fit. Experience and experiments are needed for this work. Experience can be obtained by making a start. Experiments should be as few and as far between as possible, and should be along logical lines and not be made blindly with the hopes of stumbling upon something. Experiments are being carried on in Europe. Why is so little development work being done in this country? The only answer can be that this condition results from a lack of a broad conception of the principles of the engine. We have the greatest wealth of natural fuel for this engine. Does it seem wise to wait for several years for an engine to be built for us? This would be the wise course if there were any reason why we could not develop our own engine. Europe is but just beginning to understand this engine. Why not study the engine from a thermodynamic standpoint and see what the conditions are which must be overcome in this work? Two-thirds of the fuel energy can be saved by using the fuel oil in this type of engine in place of using it under a boiler. Is this not an incentive for a better understanding of this type of engine? The ideas which have been suggested may be false. They are, however, better than no ideas and should serve, in the absence of other and better ones, as a starting point. It is confidently thought that the ideas which have been presented will be found to be entirely practical and to offer great advantages over some European practices. This, however, can only be settled after the final development of the oil engine.

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Marine News in a Personal Way

Intimate Gossip About What Leaders in the Maritime World Are Doing

J. R. McWANE, president of the American Cast Iron Pipe Co., Birmingham, Ala., has been appointed chief of the operating standardization staff of the Emergency Fleet corporation with headquarters in Philadelphia, and has assumed his duties. Mr. McWane has been most successful in the pipe business, the plant of the American Cast Iron Pipe Co. being one of the largest in the country. Some time ago Mr. McWane was considering entering the government's service in the ordnance department and went to Washington to make preparations.

* * *

JAMES CARRUTHERS, Montreal, Que., has been elected chairman of the board of the newly organized Halifax Shipyards, Ltd., Halifax, N S. The other officers of the company are: J. W. NORCROSS, president; ROY M. WOLVIN, Montreal, vice president and managing director; M. J. HANEY, Toronto, Ont., second vice president, and F. S. IZARD, treasurer.

* * *

W. H. CALLAN, general manager of plants, and W. P. PRESSINGER, general manager of sales, have been elected vice presidents of the Chicago Pneumatic Tool Co., Chicago.

* * *

W. B. GEORGE, who was formerly connected with the Greenwald Foundry Co., Cincinnati, has recently acquired an interest in the Frisbie Engine & Machine Works, 33 East Water street, of that city. Mr. George will also represent the Hartweg estate which acquired possession of the Frisbie works some years ago. The name Frisbie is well known among river engineers and steamboat owners through the development some years ago by the company of a valve gear.

* * *

W. T. SMITH has been made president of the Chester Shipbuilding Co., Chester, Pa. L. T. KNISKERN, superintendent of construction, now is general manager; W. J. LIPPINCOTT, his chief clerk, is office manager.

* * *

JOHN G. PEW became vice president and general manager of the Sun Shipbuilding Co., Philadelphia, upon his recent resignation as president of the Peoples Natural Gas Co., and Home Natural Gas Co., Pittsburgh. He served the companies for 32 years and a farewell banquet was tendered him in Pittsburgh recently by 75 employes.

* * *

FRED A. BALLIN was elected president of the Supple-Ballin Shipbuilding Corp., Portland, Oreg., upon the retirement of Joseph Supple as president. Mr. Ballin

J. R. McWANE

has been serving the company as secretary and treasurer.

* * *

DAVID HOLLYWOOD, formerly general manager of the Ames Shipbuilding & Drydock Co., Seattle, and latterly with an Oakland, Cal., concern, has been appointed works manager of the new Southwestern Shipbuilding Co., San Pedro, Cal.

* * *

J. H. HULL, vice president of the William Cramp & Sons Ship & Engine Building Co., Philadelphia, was recently elected president to succeed Harry W. Hand, resigned.

* * *

LAWRENCE H. SHEARMAN, vice president of W. R. Grace & Co., is now in London acting as shipping advisor to Raymond B. Stevens, vice chairman of the United States shipping board. Mr. Stevens is the American member of the inter-allied chartering committee, which meets at London and Paris, and has control over all American, British, French, Italian and neutral tonnage under charter to the allies.

* * *

J. H. SIMMONS, for some time with the Baldwin Shipbuilding Co. as vice president and general manager, has been appointed vice president of the Pioneer Shipping Co., with offices in New York, Seattle and San Francisco. Mr. Simmons will have charge of the Pacific coast agencies.

* * *

EDGAR JOHNSTON has resigned from the engineering department of the Submarine Boat Corp., Newark, N. J., and has joined the contractors who are constructing the huge piers and miscellaneous buildings at the embarkation point in Brooklyn.

* * *

W. R. COYLE, general sales manager of Weston Dodson & Co., Inc., Bethlehem, Pa., is now in the marine service of the government, having received the commission of captain. Mr. Coyle's first position will be at Paris island, near Charleston, S. C.

* * *

ROY S. BONSIB, formerly at the head of the safety, welfare and employment department of the United States Metals Refining Co., Chicago, has been appointed safety engineer for District No. 7 of the Emergency Fleet corporation which includes all of California and part of Oregon.

* * *

WALKER C. CONNER JR., New York, who was recently appointed assistant manager for the New York district of the United States shipping board, will look after the handling of ship supplies and materials through the various terminals.

* * *

GEORGE B. MALONE has received a commission of captain in the engineer reserve corps and will be assigned to the duty of organizing welding schools in Washington, as well as at the various cantonments. Mr. Malone formerly was superintendent of the welding and turbine blade department of the Remington Arms-Union Metallic Cartridge Co., Bridgeport, Conn.

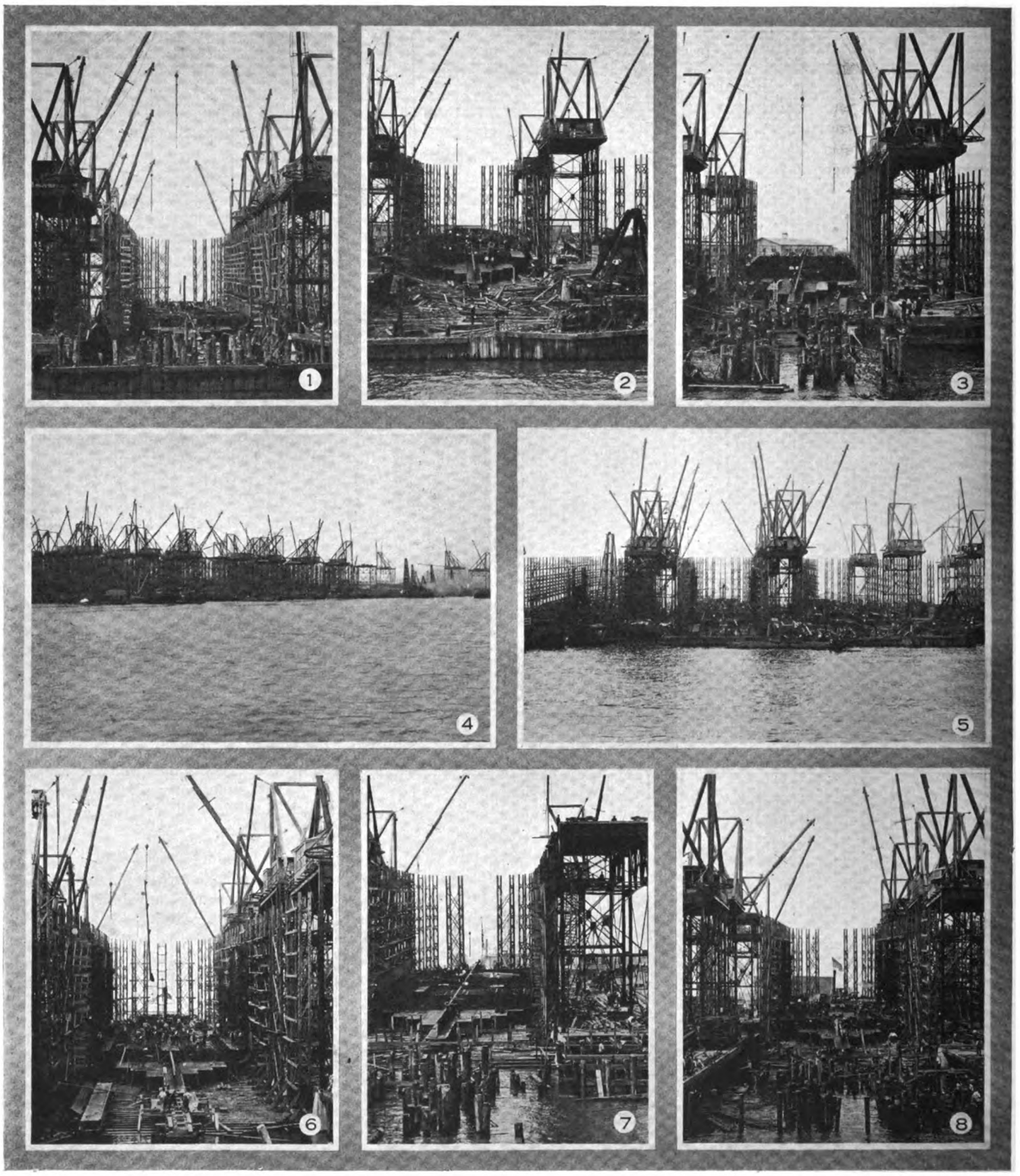
* * *

OSCAR J. BEYFUSS, a San Francisco shipping man, has joined the shipping board's operating division on the Pacific coast as a dollar-a-year man.

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Photographs From Far and Near

Contributions for These Pages Are Solicited



AS ONE VISITOR REMARKED, HOG ISLAND RANKS EQUALLY WITH THE MARNE AS THE MOST IMPORTANT PLACES IN THE WORLD. WORK ON A NUMBER OF VESSELS IS NEARING COMPLETION AND THE FIRST LAUNCHING IS EXPECTED TO TAKE PLACE IN A FEW WEEKS. THE ILLUSTRATIONS ABOVE GIVE A CLEAR IDEA OF THE SHIPWAYS, FIGS. 4 AND 5 BEING GENERAL VIEWS TAKEN FROM THE WATERFRONT. THIS YARD IS EQUIPPED WITH ALMOST EVERY LABOR-SAVING DEVICE KNOWN, AND THE MATERIAL-HANDLING EQUIPMENT WAS DEVELOPED BY SOME OF THE COUNTRY'S BEST ENGINEERS. A FULL ACCOUNT OF HOW MATERIALS ARE HANDLED AT THIS SHIPYARD WAS GIVEN IN THE MARINE REVIEW, JULY

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Latest Marine News in Pictures

Payment Will Be Made for Acceptable Photographs

Fig. 11 *copyright by Underwood & Underwood*

FIG. 9—LAUNCHING THE HOKAH AT NOANK, CONN., JUNE 4. THIS IS CONNECTICUT'S FIRST CONTRIBUTION TO THE GOVERNMENT FLEET. FIG. 10—A TRESPASSER AT THE SOO LOCKS WHO "VIOLATED THE ESPIONAGE ACT," AND THE GUARD WHO SHOT HIM. FIG. 11—THE TANKER HERBERT L. PRATT AS SHE LAY BEACHED AFTER BEING TORPEDOED OFF THE ATLANTIC COAST BY A GERMAN SUBMARINE. FIG. 12—THE CITY OF LOUISVILLE AS SHE IS NOW. SHE WAS GROUND TO PIECES IN AN ICE JAM AT CINCINNATI LAST WINTER. FIG. 13—NEW OHIO RIVER PACKET ON HER MAIDEN VOYAGE. FIGS. 14 AND 15—THE RESULT OF A GREAT LAKES COLLISION. THE VESSEL WITH THE STOVE-IN BOW IS THE AUSTRALIA. SHE WAS HIT BY THE B. F. JONES ON JUNE 15

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

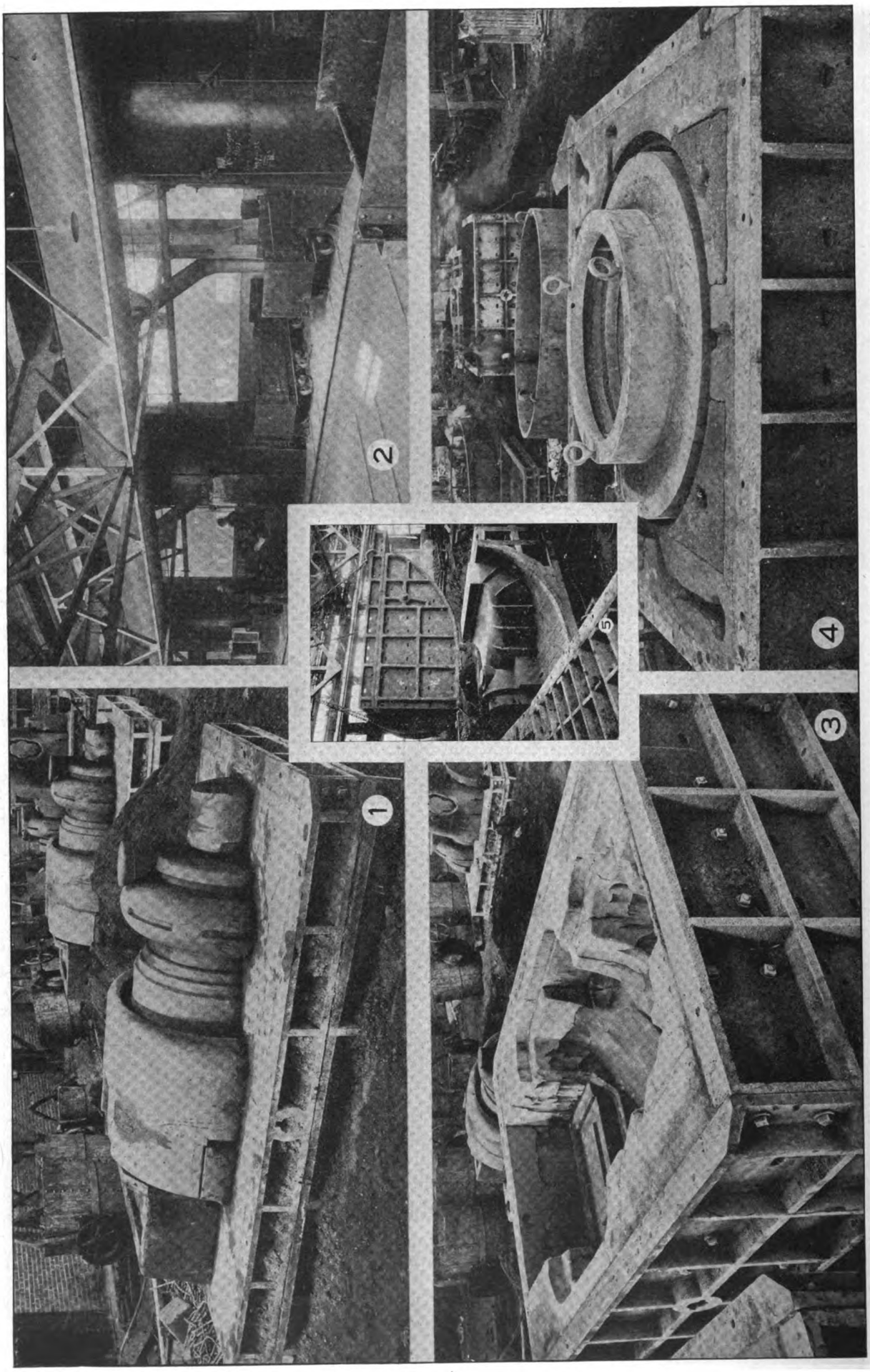


FIG. 1—DRAG AND CORE FOR TURBINE CASING BASE MOLD. NOTE COMPLICATED NATURE OF WORK. FIG. 2—TWO OF THE CUPOLAS ARE EQUIPPED WITH CHARGING MACHINES. FIG. 3—COPE FOR TURBINE CASING BASE MOLD. FIG. 4—PARTLY CORED MOLD FOR 4000-SQUARE FOOT CONDENSER SHELL. FIG. 5—DRAG PATTERN FOR EXHAUST-CONNECTION MOLD READY TO PLACE FLASK

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Modern Plant Will Make Turbines

How New Essington Works Are Equipped to Insure Maximum Production—Methods of Routing Work Have Been Carefully Studied

NEVER before has the line of demarcation between the sailing craft and the steam propelled vessel been so sharply defined as at present. The world has not time under present conditions to wait weeks and months to recruit the large crews necessary for manning fast sailing clipper ships. It is in steam, therefore, that production is being concentrated to meet the world's shortage of ocean carriers.

The propelling machinery of a ship must be dependable not only for everyday performance, but it must be capable of a burst of speed when required. The steam turbine type of propulsion, it has been found, unites these qualities in a satisfactory and economical manner.

Some months ago the director general of the Emergency Fleet corporation, in checking up the production of the materials and equipment required in vessel construction, realized that unless the production of turbines and auxiliary equipment were increased tremendously, our gigantic shipbuilding program was doomed to lag. How builders of ship propelling machinery have answered the urgent call for products on a scale beyond anything ever before known is an interesting story. The huge new plant of the Westinghouse Electric & Mfg. Co., at Essington, Pa., reflects at their best the achievements which have been made in this branch of war work.

In January, 1917, when the Westinghouse company authorized the construction of this plant, there was no indication of the tremendous industrial expansion which was to take place in the Philadelphia district after our entry into the war. Almost from the beginning, difficulty in obtaining materials, and a most acute labor shortage, proved serious handicaps in the construction and operation of the plant. Necessity, however, served as a spur to astonishing results, and progress was made rapidly.

Present Capacity is Large

The enormous Essington plant is devoted entirely to the production of ship propelling machinery of the Westinghouse type. Its present productive capacity is about 75,000 horsepower monthly, or sufficient for 15 average vessels. The product of the plant includes condensers, pumps, turbines, reduction gears, propeller shafting and auxiliary apparatus. In fact, it embraces the entire equipment between the boiler plant and the propeller of a vessel.

The particular work which now is engaging the Essington plant is the production of complete propelling equipments for the 7500-ton merchant vessels which are being built for the government by the Merchants Shipbuilding Corp. at Bristol, Pa., and for the 3500-ton government merchant vessels which the Submarine Boat Corp. is building at Port Newark Terminal, N. J.

To maintain production at the Essington at the present unprecedented rate, an elaborate system has been instituted for keeping track of the work in all its stages, in all departments of the plant. This system is designed to focus the attention of the production department uniformly upon all parts of each propelling unit, since neglect of the production of any particular part might result in chaos at the shipyards.

The keystone of the manufacturing organization, therefore, is an engineering department which cuts up each order as it is received and fits it to the other departments. The engineering department first supplies the pattern department with preliminary information which enables it to make such new patterns as are needed. It then turns over to the supply and order department a complete list of drawings, arranged by departments, which constitute a sort of cross index to the materials which will be needed in each department for turning out the order. Having a record of the materials which are on

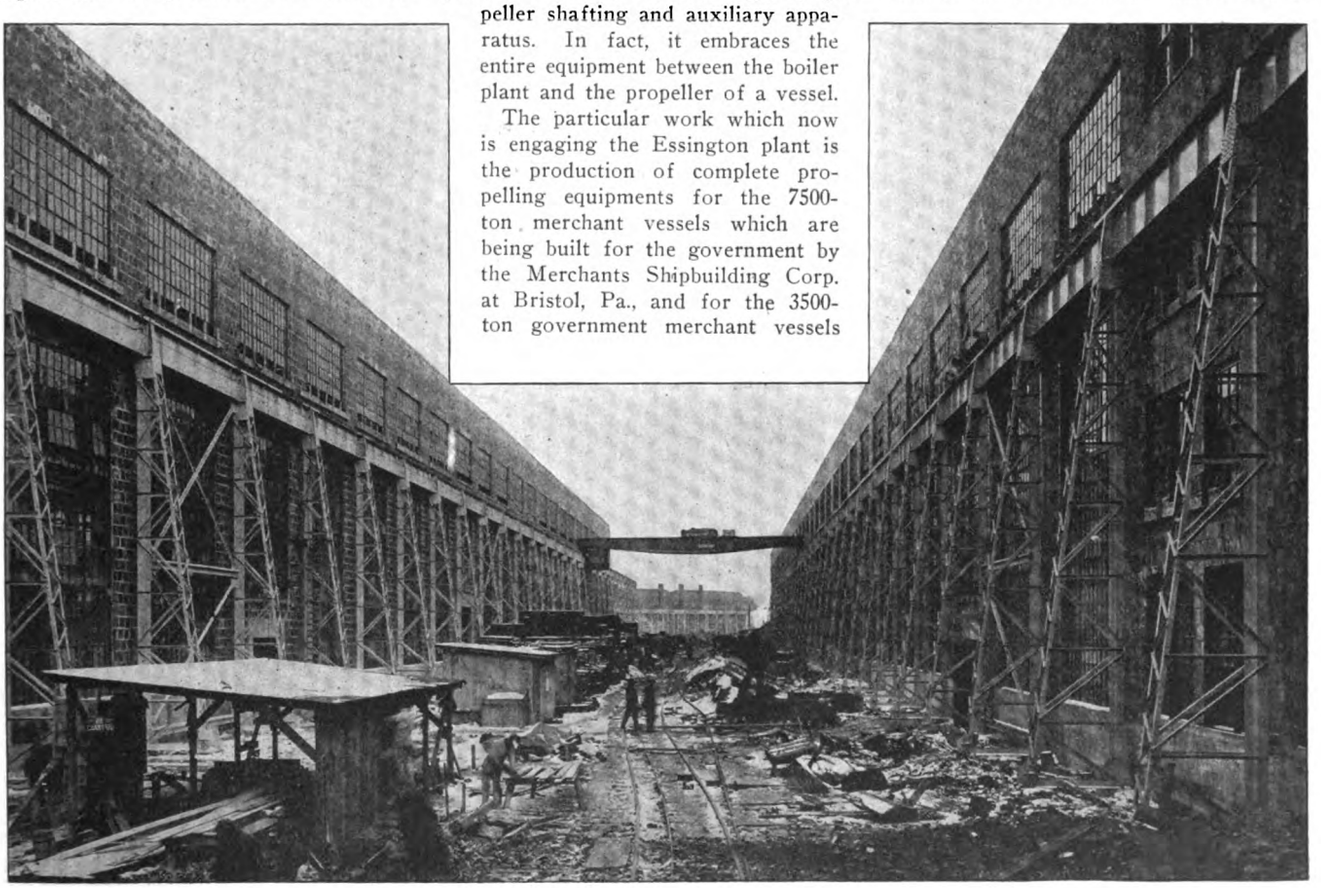


FIG. 6—CRANE RUNWAY BETWEEN MACHINE SHOPS LOOKING TOWARD FOUNDRY

Generated on 2024-07-26 17:22 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

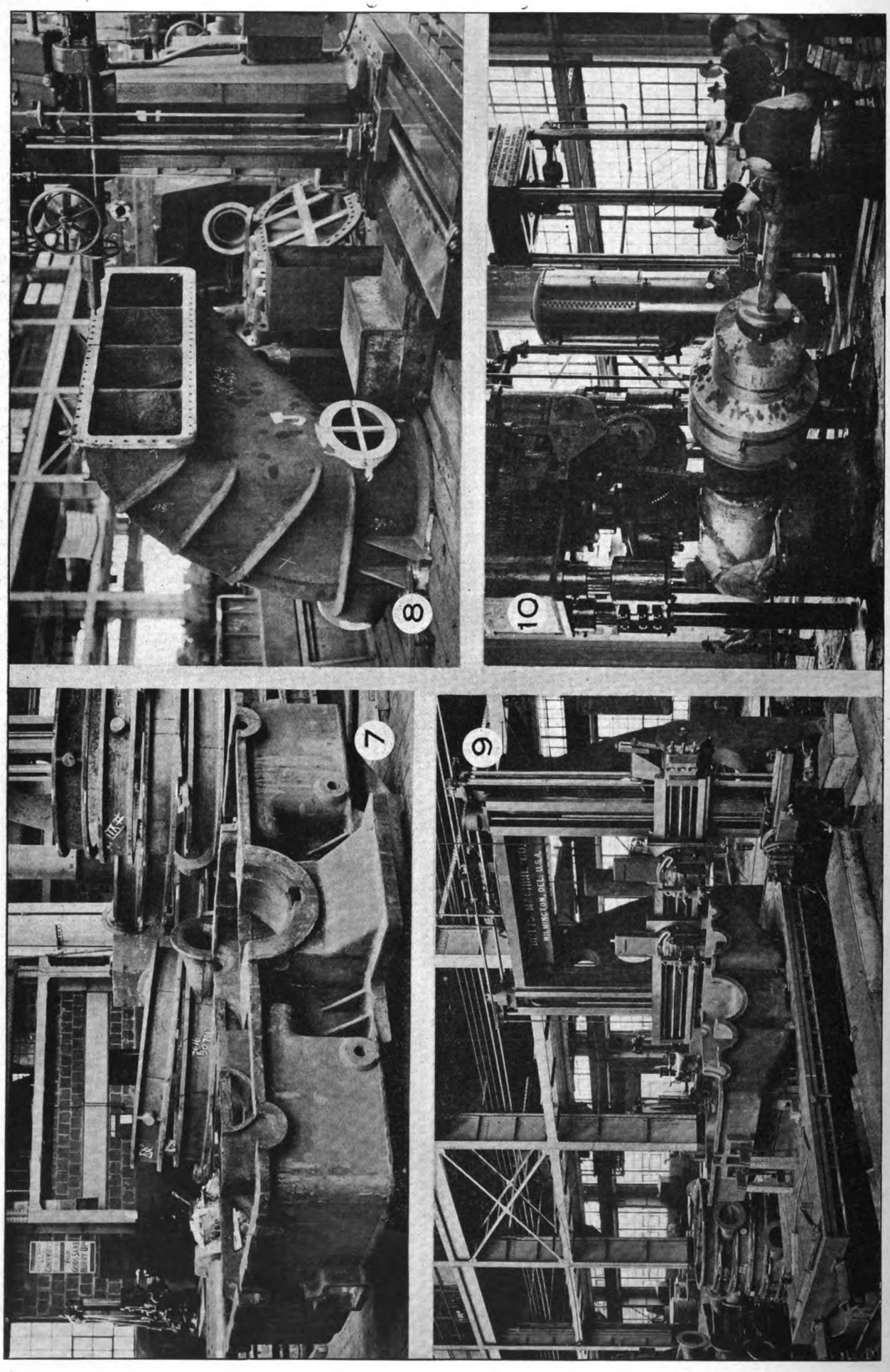


FIG. 7—REDUCTION-GEAR HOUSING BASE CASTING READY TO BE MACHINED. FIG. 8—MACHINING AN EXHAUST-CONNECTION CASTING ON A HORIZONTAL BORING MILL. FIG. 9—LARGE CASTINGS ARE FINISHED ON THE PLANER. FIG. 10—1000-TON STEAM-HYDRAULIC PRESS FOR MAKING PROPELLER-SHAFT FORGINGS

Generated on 2024-07-26 17:23 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

hand in each department, the supply and order department at once is in a position to order what is needed. Two forms then are sent to each department showing what work it is to do in connection with this particular order. One of them is on a time department sheet and the other on a production department sheet, thus providing both for accounting of time and following up of production.

It is the duty of the director of production to analyze the entire order from the standpoint of productive capacity, after which he notifies the foremen of the date when the work in each department must be done. By means of clerks, or "chasers," in each department, he constantly posts the foremen as to what parts have priority. In addition, the director of production calls a meeting of the foremen every few days to discuss all factors that have a bearing upon the progress of the work. By this system it generally is possible to tell beforehand when a particular department is likely to fall behind its schedule, and steps may be taken to overcome the difficulties before they lead to serious trouble. In this way, the shipyards are assured a steady supply of complete propelling units in accordance with their requirements.

The accompanying illustrations show some of the more important parts of a typical ship propulsion system. A particularly interesting piece is the reduction-gear housing base, which weighs 14,000 pounds. This piece is the lower

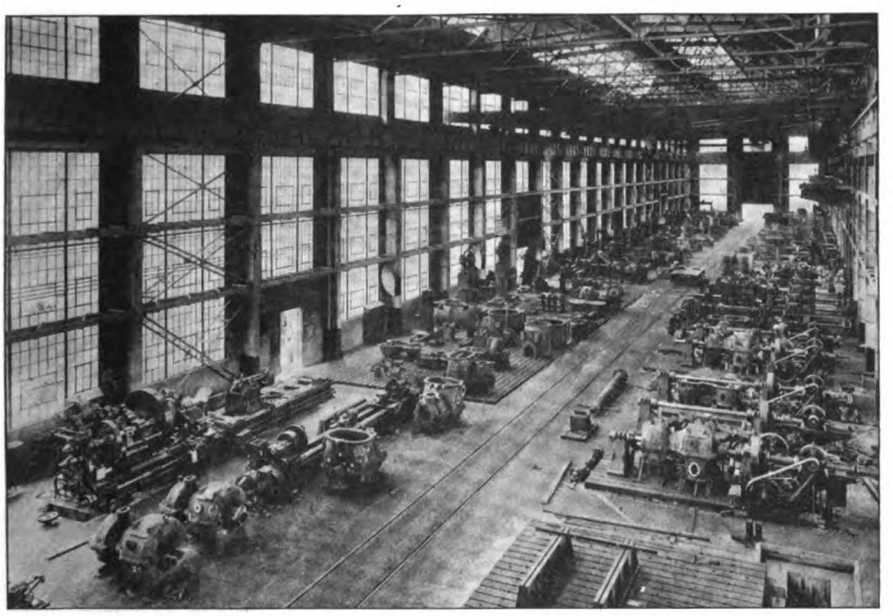


FIG. 11—NORTH BAY OF NO. 2 MACHINE SHOP LOOKING FROM ERECTING SHOP

half of the case which supports and contains the reduction gears between the turbine and propeller shaft on a 7500-ton merchant vessel. The thickness of metal is 1 inch in the web and 2 inches in the flanges.

In the propelling equipment of each 7500-ton vessel, a 4000-square foot condenser shell is required. This is composed of two castings, each weighing about 6000 pounds. One serves as the inlet and the other as outlet and the only difference between them is that one is right and the other left. One set of these castings is being produced daily. Condenser shells for 3500-ton vessels also are being produced by similar methods at the rate of one set daily. The casting which serves as the exhaust connection between the condenser and the turbine on a 7500-ton vessel weighs 9500 pounds. Three of these castings are being produced each week.

In the north bay of the foundry is located a fair sized brass, bronze and aluminum melting department. The entire nonferrous capacity is about 4000 pounds per heat. The foundry is provided with a machine repair department of its own. This is located on the first floor of the pattern storage building and is employed chiefly for making repairs to iron flasks, molding machines, and

FIG. 12—NORTH BAY OF NO. 2 MACHINE SHOP LOOKING TOWARD ERECTING SHOP

cranes. Its equipment includes a shaper, two lathes, a drill press, a bolt and pipe threader, hacksaws, milling machine, grinder, radial drill, etc. In the pattern storage building is located also a wood flask shop which is operated by the foundry department.

The pattern shop and pattern storage building at present is used for a number of purposes, owing to the fact that the patterns as yet have not accumulated sufficiently to take up much room. This structure is 135 x 400 feet, four stories high and is of reinforced concrete construction.

In an effort to reduce fire risk to a minimum, the stairways and elevators are located outside of the building proper. In addition to the pattern shop and pattern storage, this building temporarily contains the main offices of the plant, a cafeteria and dining room, a first-aid hospital, and a large tool room, in addition to the sand storage and foundry machine repair and wood flask departments.

The major departments of the Essington plant, in addition to the pattern shop, pattern storage and foundry, are the forge shop, the machine and erecting departments, and the power plant. The forge shop is 50 x 350 feet, the two machine shops are each 120 x 750 feet and the erecting shop is 130 x 550 feet.

The plant is comprised of steel, brick and hollow tile buildings, adequately lighted and ventilated, and which are so laid out as to permit the indefinite

Generated on 2024-07-26 17:23 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

extension of each department, without derangement of the manufacturing scheme. The thoroughness with which all details of construction were considered is reflected in the fact that all of the buildings are connected by well ventilated, reinforced concrete tunnels, which not only serve as conduits for water, steam, compressed air and electric current leads, but are large enough to afford communication from one building to another.

The machine shops lie parallel to each other and communicate directly with the erecting shop, jutting out from the latter at an angle of 45 degrees, which permits the railroad tracks from the machine shops to enter the erecting shop with a minimum amount of curvature. This arrangement also affords space for departmental offices, which are located in 4-story buildings occupying the triangles formed by the junction of the machine shops with the erection shop.

Shop is Fully Equipped

The floor of No. 1 machine shop is occupied by heavy tools for machining large condenser bodies, condenser tube plates, condenser covers and other condenser parts; large reduction gears, propeller shafting, etc. From the standpoint of machinery, the floor is divided into departments. One is a lathe department where all tail shafting and reduction gear shafts and pinions, are machined. Another is a drill press department, where condenser and pump parts are drilled.

Other departments contain planers, rotary planers, drill presses, etc. No. 1 machine shop has a balcony which is equipped with screw machines and other tools for handling the lighter work on pumps, condensers and reduction gears. The balcony also is provided with a machine repair department. No. 2 machine shop is devoted to the machining of turbines. The floor of this shop is given over to planer, vertical boring mill, lathe, drill press, horizontal boring mill and gear hobbing departments. The latter is comprised of large machines capable of milling teeth on gear wheels up to 160 inches in diameter. These hobbing machines were made by the company at its East Pittsburgh plant, especially for its own purposes. The balcony in No. 2 machine shop is devoted to the machining of lighter work on turbines. All machines throughout these shops are provided with individual motor drive. Each machine shop is provided with 11 cranes ranging in capacity from three to 50 tons.

In addition to standard gage railroad tracks which pass through the shops, and on which large electric trucks operate, the machine shops are equipped with numerous small storage battery floor trucks. The floors in the machine and erecting shops are of asphalt blocks. The space between the machine shops is spanned by a crane and is given over to the storage of castings which are to be machined. A novel feature is the use of concrete pits, located in the yard, for the storage of borings and turnings. As they accumulate, they are removed from the pits by a magnet and loaded into cars. Brass borings and turnings are kept separate in barrels.

Efficient Means for Testing

The erecting shop has been provided with pits and foundations for testing turbines and other propelling machinery after erection. These pits are permanently constructed and are provided with pipe connections. For conducting the tests, large quantities of water, which is taken from the Delaware river and passed through a settling basin, are required. The erecting shop contains balancing machines for conducting balancing tests upon different parts of turbine spindles. It also contains a jacket department, for making sheet steel jackets for turbines, and a pipe department.

A completely equipped forge shop has been provided for producing propeller shafting. The principal unit is a 1000-ton steam hydraulic press. The forge shop also contains a 350-ton steam hydraulic press, a 1500-pound steam hammer, two large and two small heating furnaces, two annealing furnaces, and hand forges, case hardening equipment, bolt heading machines, and other forge shop appliances. The heating and annealing furnaces are served by hot blast gas producers.

All of the buildings composing the plant are steam heated and are provided with modern facilities for the comfort of the workers. The entire plant is served by a standard gage yard railroad which is equipped with electric locomotives and cars. This road, when completed, will comprise about 41 miles of track. Water, of which large quantities are required in the operation of the plant, is obtained from the Delaware river. It first is pumped into a settling basin and then into a stand-pipe, from which it is taken as required. A sanitary sewer system with sewage disposal plant which is large enough to take care of all future requirements has been installed.

The program for future expansion when carried out will result ultimately in making the Essington plant at least three or four times bigger than it is at present.

Book Review

Lloyd's Register of American Yachts; cloth; 505 pages, 7 x 9; published by Lloyd's Register of Shipping, New York, and furnished by THE MARINE REVIEW for $8.50.

This is the 1918 edition and, as in previous years, contains complete particulars of all yachts of the United States and Canada. The specifications given are listed in tabular form and give the yacht's name, her former name if any, class of construction, whether wood or steel, type of hull, rig, sail area, official register number, signal letters, tonnage, dimensions, designer and builder, place of launching, description of machinery, owner, home port and port of registery, and classification.

There also is included an index to private signals of yachtsmen, a list of the yacht clubs and yachting associations of the United States, Canada and the West Indies, late names of yachts, key to abbreviations of yacht clubs and a list of yacht owners.

June Lake Levels

The United States lake survey reports the monthly mean stages of the Great Lakes for the month of June, 1918, as follows:

Lakes	Ft. above mean sea level May	June
Superior	601.74	602.10
Michigan-Huron	581.64	581.97
St. Clair	575.39	575.89
Erie	572.20	572.53
Ontario	247.13	247.01

Lake Superior is 0.36 foot higher than last month, 0.41 foot lower than a year ago, 0.16 foot below the average stage of June of the last 10 years, 1.33 feet below the high stage of June, 1916, and 0.86 foot above the low stage of June, 1879. During the last 10 years the June level has averaged 0.3 foot higher than the May level, and 0.2 foot lower than the July level.

Lakes Michigan-Huron are 0.33 foot higher than last month, 0.43 foot higher than a year ago, 1.19 feet above the average stage of June of the last 10 years, 1.63 feet below the high stage of June, 1886, and 2.07 feet above the low stage of June, 1896. During the last 10 years the June level has averaged 0.3 foot higher than the May level, and 0.1 foot lower than the July level.

Lake Erie is 0.33 foot higher than last month, 1.00 foot lower than a year ago, 0.42 foot below the average stage of June of the last 10 years, 1.99 feet below the high stage of June, 1876, and 0.96 foot above the low stage of June, 1895. During the last 10 years the June level has averaged 0.2 foot higher than the May level, and 0.1 foot higher than the July level.

Lake Ontario is 0.12 foot lower than last month, 0.03 foot higher than a year ago, 0.02 foot below the average stage of June of the last 10 years, 1.62 feet below the high stage of June, 1870, and 2.12 feet above the low stage of June, 1895. During the last 10 years the June level has averaged 0.2 foot higher than the May level, and 0.1 foot higher than the July level.

Generated on 2024-07-26 17:23 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

American Ship Yard Activities

A Snappy Summary of the Leading Events of the Month in the Vessel Construction Field

Government Orders Mississippi Barges

THE barge shown in the accompanying illustration was designed by the United States government for use on the Mississippi river. Bids for the construction of 24 of these vessels were invited by the war department. Each barge is to be constructed to conform closely to the drawings and specifications furnished by the government with straight sides for half-length, molded end rakes, end sheers and rounded bilges. The barges will be built thoroughly watertight throughout with a double bottom and inner sides subdivided into 22 middle and end compartments by a longitudinal center bulkhead and 12 transverse bulkheads.

Fuel oil may be carried in the double bottom and sides. The hopper formed by the inner sides and double bottom will be used for carrying iron ore or coal and it will be built clear from obstructions of any kind all fore and aft for a length of 256 feet. A pump room is to be arranged at one end of the barges below the deck containing pumps of ample capacity for receiving and discharging oil cargo and to take care of bilge water. The barges will be fitted complete with rudders, davits, capstans and all necessary deck fittings, anchors, hawsers, etc.

The general dimensions of the barges are as follows:

Length over all, feet, inches	300–1⅞
Beam at deck, molded, feet	48
Molded depth, feet	10
Length of end rakes, feet	42
Length of straight sides, feet	168
Length of peaks, feet	22
Length of cargo hopper, feet	256
Width of cargo hopper, feet	36
Depth of double bottom, feet	5
Draft, light, inches	18

For the length and width of the cargo hopper, which is 256 x 36 feet, the hull framing is to be longitudinal and at the sides and in the peak the framing will be transverse. The longitudinal framing of the nine middle, straight body, compartments on each side will consist of 7-inch x 9.75 pound channels spaced 24 inches apart from center to center. The longitudinal framing of the four end compartments and all transverse framing at the sides and in the peaks is to consist of 5-inch x 3-inch x 8.2-pound angles spaced 24 inches apart. The longitudinal framing will be intercostal and will be connected to the bulkhead plating and stiffeners with 10.2-pound flanged plate brackets and 2½ x 2½-inch x 4.1-pound reverse clips.

Transverse channels 9-inch x 13.25 pounds, spaced 6 feet between centers, will support the longitudinal framing for the whole length of the hopper on each side of the vessel between the center bulkhead and side girders to which they will be connected with 12.6-pound plate brackets and 2½ x 2½-inch x 4.1-pound double angles. The transverse frames abreast of the hopper are to extend from the side girders to the deck stringers, and in the peaks from the center keelson to the deck stringer.

Ships and the Food Problem

HERBERT HOOVER, American food administrator, took occasion in a recent address to point out that food administrations in all of the allied nations owed their creation solely to the situation in overseas shipping. One-third of the world's carrying capacity has been diverted directly and indirectly to military purposes while the remainder has suffered an unceasing loss during the war. Plenty of food is accessible to the seas but there are not enough ships to carry it from every port and still conduct the war.

He estimates that for every 5000 tons of shipping used in delivering food to the allies from North America, 15,000 tons of shipping are required from Australia and 10,000 tons from the Argentine. If the allies were compelled to go to these more remote markets for their whole food supply today it would require 2,500,000 tons more shipping than is used at present. If North America could during the next year, provide the whole of allied necessities, 1,500,000 tons of shipping would be saved.

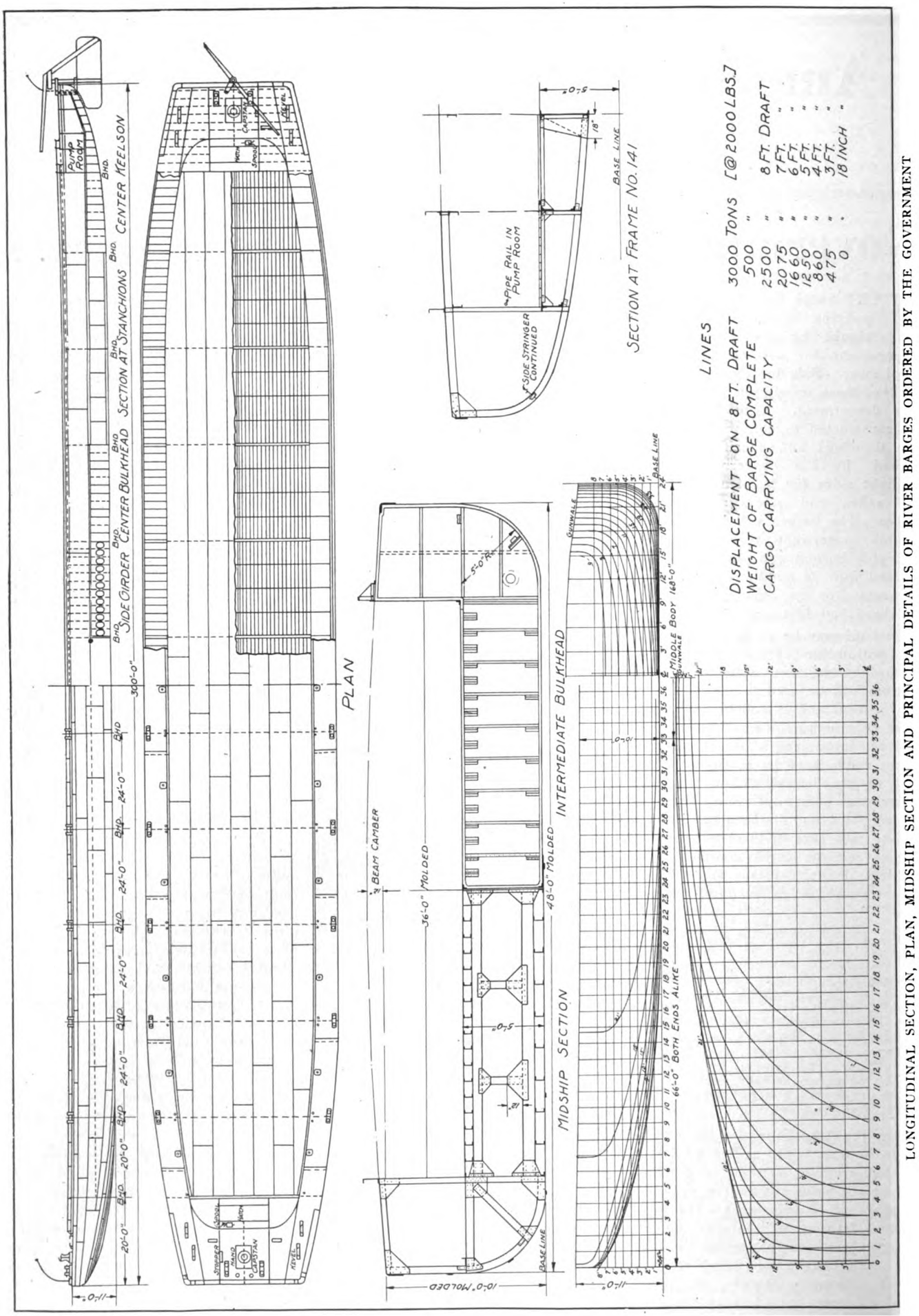
This situation sifts down, Mr Hoover pointed out, to the fact that "every ship we save is a ship built."

Center Keelson and Bulkhead

At the center line of the vessel between the end or collision bulkheads and continuous watertight bulkhead or center keelson, 5 feet high, is to be built of 12.6-pound plate. This will be stiffened with 2½ x 2½-inch x 4.1-pound vertical angles, 24 inches apart. The bottom edge of the bulkhead is to be riveted between double 2½ x 2½ inch x 5.0-pound angles connecting it to the keel plate. The top edge is to be riveted between double 2½ x 2½-inch x 4.1-pound angles connecting to the hopper bottom. The butts of plating and angles are to be 18 frame spaces apart with proper shifts of butts. A girder is to run on each side of the barge in line with the hopper side plates. Each side girder is to be built of 12.6-pound plate, intercostal between the transverse bulkheads and extending from the hopper bottom to the shell plating, to both of which the girder plate is to be connected with 2½ x 2½-inch x 5.0-pound double angles. Large lightening holes will be cut in the side girders, and the hopper side plate stiffeners are to extend down to the shell, forming stiffeners for the girders also.

A deckbeam will be located on every fame, or 24 inches apart, from end to end of the barge. The deck beams are to have a camber of 12 inches in 48 feet. The hopper bottom will be framed longitudinally with 6-inch x 8.0-pound channels spaced 12 inches between centers, intercostal between the transverse bulkheads to

Generated on 2024-07-26 17:23 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



LONGITUDINAL SECTION, PLAN, MIDSHIP SECTION AND PRINCIPAL DETAILS OF RIVER BARGES ORDERED BY THE GOVERNMENT

Generated on 2024-07-26 17:23 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

which they will be connected with 10.2-pound bracket plates riveted to the bulkhead stiffeners and to angle clips between the stiffeners.

On each side in line with the hopper bottom a hold stringer is to be fitted consisting of a 6-inch x 8-pound channel intercostal between and connected to the transverse bulkheads with 10.2-pound flanged intercostal plates. At each bilge a 6-inch x 8-pound channel stringer of the same construction as the hold stringers is to be fitted and braced to the hopper bottom with 6-inch x 8-pound channels, spaced 6 feet apart. There will be 12 transverse bulkheads.

The keel plate is to be 36-inch x 15.3-pound plate, all fore and aft with butts spaced 18 frame spaces apart. All other shell plating is to be 12.6-pound plate with butts spaced nine frame spaces apart except the sides which are to have butts 18 frame spaces apart.

The deck stringer plate is to be worked at one strake on each side amidships and it is to taper slightly toward the ends. It will be 15.3-pound, all fore and aft, and the butts will be 18 frame spaces apart. The deck plating at the ends is to be 10.2-pound run in fore and aft, joggled strakes. Under the chocks at the gunwales a 15.3-pound beveled reinforced plate is to be riveted to the deck around each end. Under all other deck fittings 12.6-pound reinforces are to be fitted.

Oregon Puts Up A Shipbuilding Record

E. V. Hauser

THE honor of delivering to the Emergency Fleet corporation and sending to sea the first completed wooden ship has been captured by the state of Oregon. The vessel was built at Portland. She is the WASCO, 286 feet long, 46-foot beam, and capable of logging 12 knots each hour with a cargo of 3600 tons. The big wooden freighter was registered under government ownership at Portland, Oreg., June 9, and dropped down the Columbia river for the open sea at 10:15 a.m. on Wednesday, June 10. She is a product of the St. Johns yard of the Grant-Smith-Porter company and her keel was one of the first to be laid by this firm.

Since the WASCO was launched the company has delivered four more wooden ships to the Emergency Fleet corporation. They are the BILOXI, KASOTA, BLANDON, and BOILSTON.

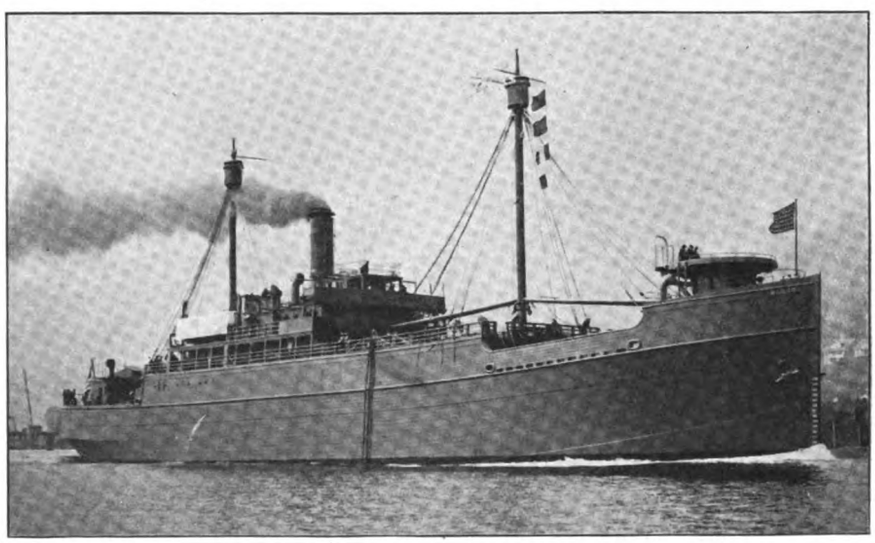
How The Company Started

In the summer of 1917, Eric V. Hauser happened to be living in the big fir district of America when the necessity for wooden ships was announced from Washington. He had retired after years of railroad building as a member of Grant Smith & Co., St. Paul. Hauser had no shipbuilders at hand, but he knew the men of the old Grant Smith crew. Messages over the wires brought them together at Portland, Oreg. They looked at the plans for a wooden ship of the Hough type, and said they could build it. Hauser took their word for it, and accepted contracts from the government for about 30 ships.

In September, the keels were ready to be laid down; but workmen who had been assembled found some sort of grievance and went on strike with shipyard workers at other plants.

After the men went back to work in November, 1917, Mr. Hauser devised a plan to put them on edge, give them enthusiasm and make them see the importance of their labor in the great scheme to win the war. He arranged for the foremen of each shift to meet him at luncheons and dinners. At these dinners he convinced the men of his friendship and interest in their prosperity. He had Dr. William T. Foster, among others, tell them of the horrors he had seen along the German trail in Belgium and in France. Soldiers from the front told the shipbuilders their stories. Every speaker asked for ships, and quick delivery. Out at the yards a band was organized to entertain the men during luncheon hours. Several times each week patriotic speakers addressed the men. Baseball teams were organized and a newspaper was started. Bonuses were given workmen who were drawing a minimum of $3.25 and a maximum of $6 each day. A community house was constructed where the men are furnished shower baths, amusements, and lockers for their clothing. The WASCO and her sister ships are the first syllable of the answer the men made.

And just inside the front gate of the big yard is a liberty rail, painted red, white and blue. On it any slacker is ridden from the enclosure.



WASCO—THE FIRST COMPLETED WOODEN SHIP TO BE DELIVERED TO THE GOVERNMENT

Locates in New Plant

The Jerguson Gage & Valve Co., formerly of 358 Atlantic avenue, Boston, is now located in a new plant at Somerville, Mass. A brick building erected at a cost of approximately $50,000, embracing 30,000 square feet of floor space, affords sufficient facilities at present for the needs of the company. An extra 15,000 square feet of land which is owned by the company, may be utilized for additions to the main building, when further expansion becomes necessary. A completely equipped foundry will be placed in operation shortly.

The Jerguson company is devoting its capacity exclusively to the manufacture

Generated on 2024-07-26 17:23 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

of water gage apparatus. The equipment has been standardized so that it may be used on all boilers aboard ship, both in the navy and in the merchant marine. This standardization is designed to permit replacements to be made easily.

To Increase Capacity

With three ways now in operation, four nearly completed and 10 to be built the Moore Shipbuilding Co., Oakland, Cal., promises to become one of the largest individual shipbuilding units in the world. This is the announcement of George A. Armes, president and general manager of the company.

The enlarged plant will give employment to 20,000 men, instead of 8000 as at present, and with 17 ways, the plant will have capacity for more than 200,000 tons of hulls under construction simultaneously. Some of the ways will be designed to accommodate 20,000-ton vessels. The wharves between each of the ways will be extended far enough to provide mooring space for each vessel as it is launched.

When the plants of the Moore company, Bethlehem Shipbuilding Corp., Union Construction Co., the Hanlon Co., the new government concrete shipbuilding plant and a few smaller yards are in full operation, it is estimated that more than 50,000 men will be employed directly in ship construction on the Oakland estuary.

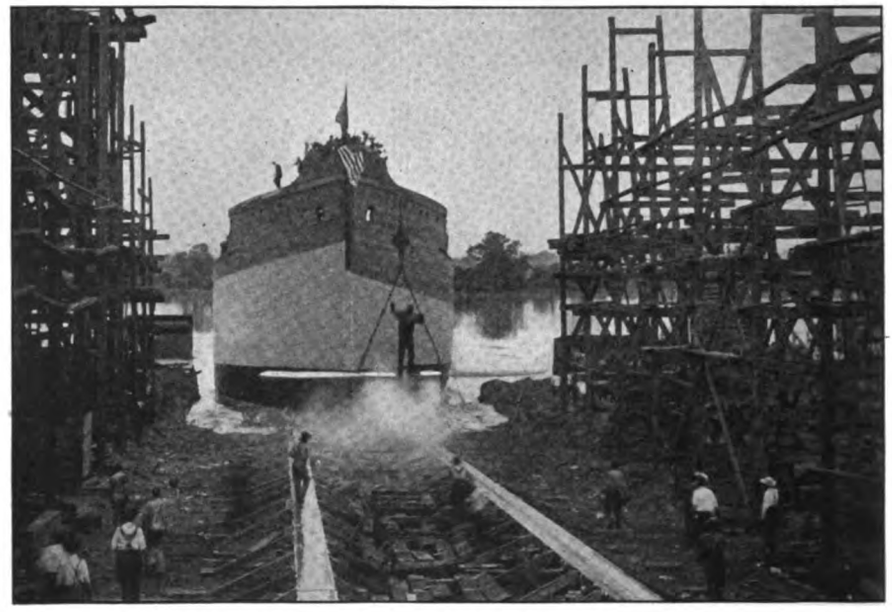
The serious problem of housing some quarter of a million persons is being met by city officials of Oakland and Alameda who are co-operating with the members of the chambers of commerce and other civic organizations in considering and perfecting plans to meet the emergency.

Makes Big Additions

Ranking now as the largest wooden shipbuilding plant on San Francisco bay, extensive improvements involving an expenditure of $1,500,000 are being made by the Barnes-Tibbitts Shipbuilding & Drydock Co., Alameda. These will rank the establishment among the leading wooden shipbuilding concerns on the Pacific coast, according to the announcement of Capt. Walter G. Tibbitts, president of the company. In the course of six months it is expected that the company will be engaged in constructing standardized government steel freighters, on a large scale it is said.

At present, contracts are held for the completion of four 2500-ton government vessels. Machine shop, pipe fitting work, blacksmith shop, foundry, storeroom, planing mill and warehouse have been completed and two of the three proposed ways are under construction. When complete, the plant will have a construction capacity of eight ships up to 10,000 tons. Approximately $1,000,000 has been expended so far.

There are 28 acres in the Barnes-Tibbitts yards of which 8 acres extend into the water with a waterfront of a quarter of a mile.



SAVANNAH YARD ESTABLISHES KEEL LAYING RECORD

The vessel taking the water is the Quinnesec built by the Terry Shipbuilding Corp., Savannah, Ga. As she left the ways, the first section of another keel was laid in 90 seconds, establishing a new record for this performance. The illustration shows the first keel plate as it was being lowered in place. The Quinnesec is a composite ship of 3600 tons deadweight, 285 feet long, 41 feet beam, first of ten of the same type building by the Terry corporation for the government

Latest News from American Shipyards

THE plants and contracts of the bankrupt Sandstrom Shipbuilding Co., Meadow Point, Seattle, have been purchased by the J. H. Price Shipbuilding Corp. This yard had three wooden ships on the ways when financial difficulties forced it to suspend. The new owners intend to enlarge the plant and to employ 1000 men. The Sandstrom yard now has six ways and holds six contracts, the list including two 2500 motor ships and two of 3000 tons for Norwegian interests as well as two 3000-ton ships for Italian interests. Mr. Price is a well known wooden shipbuilder, being president of the Cameron-Genoa Co., Victoria, B. C. He is also interested in wooden shipbuilding plants in Oregon and California.

* * *

Active work has begun on the site at Everett, Wash., of the Norway Pacific Construction & Dry Dock Co., which has contracts for a number of steel steamers. A thoroughly modern plant is to be built and rapid progress is now being made. This company was organized by Norwegian capital.

* * *

Having completed a 550-ton concrete barge, the Inter-Ocean Barge & Transport Co. has acquired a new site in Seattle where it will install a large concrete plant. This is the first concrete yard established in the Pacific Northwest. The company has two contracts for concrete steamships, one of 1500 tons and one of 1200 tons.

* * *

Steamer BEAUMONT, Ferris type, was launched recently by the McBride & Law Shipbuilding Co., Beaumont, Tex. The International Shipbuilding Co. recently launched the big bark CITY OF DALLAS, from its yards at the same place.

* * *

Steamers LONE STAR, built by the Lone Star Shipbuilding Co., and ONECO, built by the Beaumont Shipbuilding & Drydock Co., having installed all machinery, left Beaumont for an Atlantic port early in July.

* * *

QUAMAKONING, 3500-ton Ferris type wooden steamer, was launched from the yard of the Beaumont Shipbuilding & Drydock Co., early in July. It is expected that she will be in shape to leave for an Atlantic port late in August.

* * *

The Concrete Engineering Co., Chicago, has selected a site on the new

Generated on 2024-07-26 17:24 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

industrial canal, New Orleans, and will establish a yard there for constructing concrete vessels and barges.

* * *

Fifty cottages for white workmen have been completed for the Chickasaw Shipbuilding Co. at its plant near Mobile, Ala., and workmen have begun construction of 100 cottages for negro employes. The 50 cottages for the white men were built in 33 days.

* * *

The state harbor commission of Alabama has given permission to the Kelley-Thompson Shipbuilding Co., Mobile, to erect a marine railway and drydock on Blakely island, and to the Alabama Dry Dock & Shipbuilding Co. to dredge a part of Pinto island for slips for new docks. The Bell Telephone Co. is laying cables across Chickasaw creek, near Mobile, to accommodate the large colony of shipbuilders which has grown up on the side away from the city.

* * *

W. L. Kelly and M. R. Fife, Chicago, have sold their interests in the Mobile Shipbuilding Co., Mobile, to the Terry Shipbuilding Co., New York.

* * *

The St. Petersburg Shipbuilding Co., $30,000 capital, has been organized to build barges, schooners and tugs, at St. Petersburg, Fla.

* * *

Wooden steamer DANCEY, 3500 tons, the first to be built there under contract for the government, was recently launched from the ways of the J. M. Murdock Shipbuilding Co., Jacksonville, Fla. The keel of another ship of the same size was laid immediately in the ways vacated by the DANCEY.

* * *

The Liberty Shipbuilding Corp., New York, will establish a yard at Biloxi, Miss., according to J. E. Breaux, Jr., president of the Biloxi commerce club.

* * *

The Henry Piaggio Co. has launched another 3000-ton wooden ship from its yards at Orange, Tex., for the Italian government. Several of the company's ships of this type are now in overseas service.

* * *

Howard & Nelson, Orange, Tex., have launched a 64-foot, oil-burning tugboat.

* * *

The Terry Shipbuilding Corp., Savannah, Ga., has closed a contract with the United States shipping board to build an 8000-ton drydock, at a cost of approximately $1,000,000, to be located on the Savannah river. The company has acquired 100 acres with 1500-foot frontage on the river for $500,000.

* * *

August is expected to be the greatest month for ship launching that Savannah has ever seen. Every shipbuilding concern located in the city will launch one or more ships. The Foundation Co. will lead the race with four mine sweepers. These vessels are 150 feet long, draw 17 feet of water and have a 37-foot beam. The Georgia Shipbuilding Co. will launch another 4-mast schooner, valued at $150,000. The schooners built by this company have a deadweight capacity of 1400 tons. A second seagoing towboat will be launched by the Savannah Engineering & Construction Co. This company has a government contract to build seven seagoing towboats. They are too large to be used in an ordinary harbor. The Terry Shipbuilding Corp. will also launch a steel composite merchantman during the first part of August. The National Shipbuilding & Dry Dock Co. will launch eight barges. The company has set a record of launching two of these barges a day for a week.

* * *

The Randsberg Iron Works, New York, is reported to have bought a 9-acre tract on the East river, and is planning to construct a $1,000,000 drydock.

* * *

A large shipbuilding plant will be constructed on property known as the Palmer docks, Brooklyn, N. Y., which was recently purchased by the Greenpoint Improvement Co.

* * *

Charles Schwab, Emergency Fleet director general, recently at a dinner announced another shipbuilding plant to cost $10,000,000 will be built on the banks of the Delaware river. The capacity of the proposed yard and other details are now being worked out.

* * *

Preliminary plans are being drawn by the Terminal Transit Co., Jersey City, N. J., for a shipbuilding plant, comprising four ways. J. T. O'Connor, New York, is manager of the company.

* * *

The Kelly-Spear Co., Bath, Me., it is said, will spend $30,000 in improving its shipbuilding yard.

* * *

Pacific coast managers of the Foundation Co., Seattle, have announced that plans for adding a new unit to the Tacoma, Wash., yards for steel ship construction are now under consideration.

* * *

The Todd interests at Tacoma, Wash., are said to be making arrangements for the erection of additions to their present plant. The improvements will cost in the neighborhood of $1,000,000.

* * *

Two shipbuilding ways are to be constructed at the plant of the Columbia River Shipbuilding Co., Portland, Oreg. The company now has three ways.

* * *

The American Concrete Pipe & Shipbuilding Co., Tacoma, Wash., has secured a site of 12 acres on Lake Washington, which will be cleared at once and two ways constructed for building 7500-ton and 10,000-ton concrete vessels. Ways for constructing barges of 1000-ton capacity will also be built. It is reported that contracts for ten 10,000-ton concrete vessels for foreign registry to cost $20,000,000 have already been offered the company. L. Y. Stayton, A. H. Gardiner, S. W. Bunting and W. F. Hallowell are officers of the company.

* * *

Plans have practically been completed whereby Portland, Ore., and Vancouver, B. C. capitalists will establish a sawmill and shipyard at North Bend, Oreg., at a cost of $500,000, it recently was announced by L. J. Simpson.

* * *

Terry & Tench have taken a contract to build 20 government barges to be operated on the New York state barge canal. These vessels, for which a total of 3200 to 3300 tons of fabricated plates and shapes are required, will be built in Brooklyn, N. Y.

* * *

The Bethlehem Shipbuilding Corp. is about to let contracts for erecting additions to its Sparrows Point, Md., plant. They will include a fabricating shop extension, an addition to the angle storage shop and a roof over the laying out yard. The Bethlehem Shipbuilding Corp. is in the market for 400 tons of fabricated steel for this work.

* * *

The first launching at Hog island is to take place on Sunday, Aug. 4. Sunday has been selected so that everybody can see the RED JACKET slip from way No. 1 into the Delaware. Its keel was laid on Lincoln's birthday, Feb. 12, the launching coming 173 days later.

* * *

Mayor Peters, Boston, has approved a contract with the Boston Shipbuilding Co. for $69,000 for repairs and renewals to the ferryboat GENERAL SUMNER, which was burned to the water's edge more than a year ago. The same firm also secured the contract to repair the steamer MONITOR for $3800.

* * *

The Dauntless Shipbuilding Co., Essex, Conn., has plans for shipyard and river improvements that will call for the outlay of approximately $100,000. The improvements call for the dredging of a channel 200 feet long, 100 feet wide and 9 feet deep in the river leading to the company's yards and the making of such changes in the docks as will permit the docking of much larger vessels than can be accommodated at the present time. The Edward Balf Co., Hartford, Conn., secured the contract for dredging.

* * *

The Motorship Corp., San Francisco, will establish a plant at Martinez, Cal., in the near future for building concrete ships. The corporation will direct its greatest efforts toward turning out refrigerator ships.

* * *

The Northwest Steel Co., Portland, Oreg., is said to be planning to double the capacity of its plant by constructing four additional shipbuilding ways. Full equipment to outfit vessels will be installed.

* * *

The Heffernan Engineering Co., Seattle, recently acquired title to a strip of waterfront, which will be improved and converted into ship repairing plant.

* * *

M. H. Tholme, president of the North-Pacific Construction & Dry Dock Co., recently closed a contract for the purchase of a site for a shipbuilding plant and dry dock. It is to be 1200 feet wide and 1000 feet deep.

Generated on 2024-07-26 17:24 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Generated on 2024-07-26 17:24 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

ORGANIZATION OF THE UNITED STATES SHIPPING BOARD

COMPILED BY THE MARINE REVIEW

X INDICATES NEW YORK ADDRESS: ALL OTHERS WASHINGTON.

CHARTERING COMMITTEE
11 Broadway
To carry into effect control over American and neutral tonnage and bunkering arrangement.
Chairman, Welding Ring.
A. C. Fetterolf. J. B. Smull.
Secretary, Morris Malkin.
Assistant Secretary, George M. Bress.

PUBLICATION SECTION
Executive Head.....Robt. D. Heinl
Executive Assistant.....Julius S. Holl
Assistant .....Robert A. Hardy
Editorial Assistant.....Stuart O. Blythe

REPRESENTATIVE ON WAR TRADE BOARD
Represents the Board on all War Trade Board matters in which the Shipping Board is concerned.
Frank C. Munson.
Confidential Clerk, M. J. McCrisaken.

LAKE SHIP ACTIVITIES
In charge of acquisition, cutting and removing of vessels from the Great Lakes to the sea.
Special Agent in Charge.....F. A. Eustis

DISBURSING OFFICE
Audits and pays expenses of the Shipping Board.
Disbursing Officer.....W. L. Soleau
Assistant Disbursing Officer.....I. P. Henderson

CHAIRMAN'S OFFICE
1319 F St., N. W.
Edward N. Hurley, Chairman.
Vice-Chairman.....Raymond B. Stevens
Commissioner .....Bainbridge Colby
Commissioner .....John A. Donald
Commissioner .....Charles R. Page

SECRETARY'S OFFICE
Executive and Administrative Office of the Board.
Secretary.....Lester Sisler
Office Manager.....J. W. Riedell
Minutes and Resolutions.....Wm. C. Ward
Correspondence Section.....Charles S. Brock
Personnel Section.....E. J. Skidmore
Stenographic Section.....Corral H. Hunt
Files Section.....Lloyd R. Roberts
Library.....Jerry C. Massey

DIVISION OF OPERATIONS
General supervision of operation of Shipping Board vessels and vessels under requisition.
Director .....J. H. Rosseter
Division of Tanks.....R. C. Butler
Rates and Claims.....G. W. Sterling
Assignments, Charters and Allocation, F. C. Lockhart
Marine Superintendent Captain.....J. W. Munn
Assistant Director.....D. L. Ewing
Assistant to Director.....C. D. Mallory
Comptroller.....John J. Nevin
Assistant Comptroller.....I. P. Henderson
Deputy Controller.....W. L. Soleau
Manager, Sailing Vessels Department, J. F. Andrews
Manager, Contract Department....J. M. Whitsitt

BOARD OF APPRAISAL
280 Broadway
To make survey of merchant vessels requisitioned by the Shipping Board.
Captain A. S. Halstead, Senior Member U. S. N.
Lieut. Commander Stevenson Taylor, U. S. N. R. F.
Lieut Commander A. L. Swasey.
Lieut. Commander Daniel Bacon, U. S. N. R. F.
Naval Constructor H. G. Gilmore.

LAW DIVISION
Advises other departments of the Board on all legal matters.
Chief Counsel.....Edward B. Burling
Admiralty Counsel.....Ira A. Campbell

INSURANCE COMMITTEE
Advises and makes recommendations to the Board on all questions relating to marine, war risk, protection and indemnity insurance.
Chairman, Hendon Chubb.
William R. Hedge. Herbert F. Eggert.
Secretary, Bryan K. Ogden.

REPRESENTATIVE ON PRIORITIES COMMITTEE
Represents the Board on all Priorities Committee matters in which the Shipping Board is concerned.
Representative.....Charles P. Howland

DIVISION OF REGULATION
Regulates rates and practices of interstate water carriers
Attorney Examiner.....Otis B. Kent
Assistant Examiner.....Henry E. Manghun

Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Generated on 2024-07-26 17:25 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

NATIONAL ADJUSTMENT COMMISSION
1319 F Street

Handles longshoremen's disputes.
Chairman, R. P. Bass.
Stanley King, War Department.
E. A. Kelley, representing coastwise trade ship operators.
J. G. Rosseter, representing deep sea interests.
H. C. Blackiston, representing deep sea interests.
M. J. Sanders, representing deep sea interests.
E. J. Barber, representing deep sea interests.
R. R. Freeman, representing deep sea interests.
T. V. O'Connor, representing International Longshoremen's Association.
Secretary, Louis Levy.

SHIPBUILDING LABOR ADJUSTMENT BOARD
220 Munsey Building

Adjustment of disputes in shipyards doing work for the Government.
Chairman, V. Everet Macy, representing the Public.
A. J. Berres, representing labor.
L. A. Coolidge, representing Navy Department, Shipping Board and Emergency Fleet Corporation.
Secretary, H. R. Seager.
Statistician, Leland Olds.
Statistician, Stuart Moore.

DIVISION OF PLANNING AND STATISTICS

Makes shipping available for war purposes by furnishing information in accordance with which imports are limited and shipping controlled.

Director.....Edwin F. Gay
Assistant Director.....Henry S. Dennison
Trade Conferences.....T. W. Slocum
Assistant.....G. F. Porter
Commodities Branch.....W. S. Tower
Minerals Committee.....C. K. Leith
Statistical Auditor.....W. M. Persons
Price Statistician.....W. C. Mitchell
Tonnage Inventory.....Horace Secrist
Ship Scheduling.....Wallace Clark

SHIPPING CONTROL COMMITTEE
45 Broadway

To obtain most effective use of all tonnage under the American flag, utilizing all agencies which now exist, or may be created, for this purpose.
Chairman, P. A. S. Franklin.
H. H. Raymond. Sir Connop Guthrie.
Secretary, Cletus Keating.

NEW YORK
DIVISION OF OPERATIONS
321 Custom House

Agent.....Charles Yates
Assistant Agent.....Frank W. Seth

BOSTON, MASS.
DIVISION OF OPERATIONS
804 Marshall Building

Despatch Agent.....W. K. Irving

RECRUITING SERVICE
Custom House

Director.....Henry Howard

COAL TRANSPORTATION AGENCY
148 State Street

Agent.....A. L. Crowley
Assistant to Agent.....W. J. Hanna

BALTIMORE, MD.
DIVISION OF OPERATIONS
Merchants' and Miners' Transportation Building

Special Despatch Agent.....W. W. Tingle

NORFOLK, VA.
DESPATCH AGENCY, DIVISION OF OPERATIONS
399 New Monroe Building

Special Despatch Agent.....L. T. Nelson
Assistant Despatch Agent.....F. X. Irwin

NEW ORLEANS, LA.
DIVISION OF OPERATIONS
606 Hibernia Bank Building

Representative.....Samuel W. Weis
Assistant Representative.....W. R. Lincoln

CLEVELAND
DIVISION OF OPERATIONS
420 Perry Payne Building

Representative - - - - W. M. Williams
Assistant Representative - - - H. L. McDonald

SEATTLE, WASH.
DIVISION OF OPERATIONS
607 Securities Building

Assistant Director of Operations..J. D. Lowman

PORTLAND, ORE.
DIVISION OF OPERATIONS
501 Northwestern Bank Building

Agent.....C. D. Kennedy

SAN FRANCISCO, CAL.
DIVISION OF OPERATIONS
343 Sansome Street

Assistant Director of Operations....C. W. Cook

BOARD OF SURVEY AND CONSULTING ENGINEERS
52 Beaver Street

To advise the Shipping Board on all matters relating to the inspection and repair of enemy vessels, as well as other ship construction work specially authorized.
Chairman, Frank S. Martin.
Stevenson Taylor, President, American Bureau of Shipping.
J. Howland Gardner, Vice-President, New England Steamship Company.
George J. Robinson, Robins Dry Dock Company.
Advisory Assistants—Colonel Carson, United States Army. Commander Jessup, United States Navy.

SHIP PROTECTION COMMITTEE
1217 F St., N. W.
EXECUTIVE COMMITTEE

Chairman, Rear Admiral Rousseau.
Rear Admiral Couden. A. M. Hunt.
W. L. Donnelly.

GENERAL COMMITTEE

Carries out arrangements to protect merchant ships from submarines.

Chairman, John A. Donald, Commissioner, U. S. Shipping Board.
Rear Admiral A. R. Couden, Bureau of Ordnance, Navy Department.
Hendon Chubb, Insurance Committee, U. S. Shipping Board.
Eugene T. Chamberlain, Commissioner of Navigation, Department of Commerce.
A. M. Hunt, Naval Consulting Board.
Rear Admiral H. H. Rousseau, Emergency Fleet Corporation.
Captain Charles A. McAllister, U. S. Coast Guard.
Captain W. P. Scott, Bureau of Operations, Navy Department.
A. J. Mason, Emergency Fleet Corporation.
J. L. Ackerson, Assistant to Director General, Emergency Fleet Corporation.
F. C. Munson, War Trade Board.
William L. Donnelly, 17 Battery Place, New York City.
George Uhler, Supervising Inspector General, Steamboat Inspection Service.
L. B. McBride, Naval Constructor, U. S. N.
J. G. DeRemer, Secretary, Ship Protection General Committee.

Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Generated on 2024-07-26 17:26 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

ORGANIZATION OF THE EMERGENCY FLEET CORPORATION

COMPILED BY THE MARINE REVIEW

CONSTRUCTION
OFFICE OF VICE-PRESIDENT IN CHARGE

Vice-President.....Charles Piez
Private Secretary.....Charles H. McCarthy
Executive Assistant.....Robert W. Leatherbee
Executive Assistant.....A. P. Mathesius
Office Assistant.....Michael Woskoff
Staff Specialist (Power).....Fred'k W. Ballard
Staff Assistant (Power).....Walter N. Polakov
Staff Assistant.....Robert B. Wolf

OFFICE OF THE DIRECTOR GENERAL

Director-General.....Chas. M. Schwab
Private Secretary.....J. H. Miller
Executive Assistant,
J. L. Ackerson, Naval Constructor, U. S. N.
Office Assistant.....Geoffrey Creyke

ADMINISTRATION
OFFICE OF VICE-PRESIDENT IN CHARGE

Vice-President.....Howard Coonley
Private Secretary.....Miss M. Prouty
Executive Assistant.....Thos. P. Beal, Jr.
Executive Assistant.....Edgar C. Rust
Staff Assistant (Meth. & Org.),
Capt. W. B. Holton, Jr.
Staff Assistant (Meth. & Org.).....J. L. Jacobs

Admiral Francis T. Bowles.
Assistant General Manager,

STEEL SHIP PRODUCTION DIVISION

Supervision of steel ship production; acceleration; aids in management; development of management methods.

Manager.....Daniel B. Cox
Assistant Manager.....Laurens N. Prior
Assistant to Manager.....Arthur B. Haley

Inspection and Production Section

Supervision of Steel Ship Production.

Executive Head.....Pierce J. McAuliffe
Assistant.....D. T. Williams
Assistant.....J. F. Barber
Assistant.....G. H. Bonsall
Assistant.....C. H. Greene

Concrete Ship Construction

Chief Engineer.....R. J. Wig
Assistant Chief Engineer.....H. J. Brunnier
Assistant Chief Engineer.....L. R. Ferguson
Chemical Engineer.....G. W. Coggeshall

WOOD SHIP PRODUCTION DIVISION

(Including Composite and Concrete Ships)

Supervision of wood, composite and concrete ship production; acceleration; aids in management; development of management methods.

Manager.....Jas. O. Heyworth
Assistant Manager (Machinery Installation),
J. D'Esposito
Assistant Manager (Hulls).....R. H. Beattie
Executive Aide.....G. E. Tebbets

Technical Section

Designs and Specifications for ship hulls, machinery and equipment.

Naval Architect.....Herbert C. Sadler
Assistant Naval Architect.....Axel Russell
Assistant to Naval Architect..A. J. C. Robertson
Assistant to Naval Architect..H. H. Thayer, Jr.
Chief Engineer.....R. L. Lovell
Assistant Chief Engineer.....Angelo Conti
Chief Constructor.....James R. Harrison
Ins. Naval Engineer.....Wm. J. Wood
Chief Hull Draftsman.....Alfred H. Haag

PURCHASING DIVISION

Purchase of raw materials; component parts; equipment and machinery.

General Purchasing Officer.....F. A. Browne
Asst. Genl. Purchasing officer.....A. L. Bell
Distributing Section.....Joseph Birnie
Supervising Inspector.....E. A. Rebbeke
Asst. Purchasing Officer (Raw Materials),
G. R. Jasper
Asst. Purchasing Officer (Outfitting Ships),
J. P. Bourke
Asst. Purchasing Officer (Mechanical),
T. D. Adams
Asst. Purchasing Officer (Mechanical),
O. S. Maple
Asst. Purchasing Officer (Electrical),
W. R. McCann
Purchasing Asst.—Priorities.....A. L. Lewis
Lumber Administrator.....J. H. Kirby
Logging Officer.....James Bentley
Asst. Purchasing Officer (Lumber)..J. K. Fawcett
Asst. Purchasing Officer (Lumber)..F. H. Paxton

PASSENGER TRANSPORTATION AND HOUSING DIVISION

Supervision of development of housing and passenger transportation facilities.

Director.....A. Merritt Taylor

Transportation

Asst. Director of Transportation.Garrett T. Seely
Special Agent.....Edw. F. Burnett
Engineer.....Jilson J. Coleman
Engineer.....Chas. B. Cooke, Jr
Engineer.....Chas. F. Hewitt
Engineer.....Wm. W. Handy
Engineer.....Jno. C. Thirlwall
Engineer.....James W. Wesh

Housing

Asst. Director for Housing...J. Rogers Flannery
Director of Production.....Robt. D. Kohn
Asst. Director of Production....Frank Goodwillie
Manager Construction Branch.....W. G. Luce
Deputy Director Production.....E. J. Russell
Head Designer.....F. L. Ackerman
Chief Engineer.....Morris Knowles
Town Planner.....B. A. Haldeman
Genl. Supervisor.....D. M. Hepburn
Property Manager.....Dr. Milo R. Maltbie
Principal Assistant to Director..W. Purves Taylor
Manager of Investigation Branch...W. E. Guerin

FINANCE DIVISION

Financial requirements; the budget; allotments; credits; insurance; property accountability.

Comptroller.....D H.. Bender
Credit Manager.....T. E. New
Insurance Manager.....G. A. Hayes

CONTRACT DIVISION

Negotiation of Contracts.

Manager.....M. D. Ferris
Assistant Manager.....A. V. Bouillon

STATISTICAL SECTION

Development and maintenance of general statistical records.

Chief Statistician.....Frank J. Warne

PUBLICATION SECTION

General publications, advertising and publication of EMERGENCY FLEET NEWS.

Executive Head.....Robert D. Heinl
Executive Assistant.....Julius S. Holl
Assistant.....R. A. Hardy
Editorial Assistant.....Stuart O. Blythe
Managing Editor, EMERGENCY FLEET NEWS,
W. C. Mattox
Asst. Managing Editor, EMERGENCY FLEET NEWS.....Albert G. Brenton

Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Generated on 2024-07-26 17:26 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

AUTHORIZED AND RESIDENT REPRESENTATIVES, DISTRICT OFFICERS, DISTRICT SUPERVISORS

American International Shipbuilding Corporation, Hog Island, Pa.
Authorized Representative.....C. S. Bookwalter

Merchants' Shipbuilding Corporation, Bristol, Pa.
Authorized Representative.....Henry E. Frick

Submarine Boat Corporation, Newark Bay, N. J.
Authorized Representative.....H. C. Higgins

Carolina Shipbuilding Corporation, Wilmington, N. C.
Resident Representative.....John W. Towle

District No. 1, Boston, Mass.
District Officer.....Fred'k Conlin
District Supervisor.....John F. Vaughan

District No. 2, New York, N. Y.
District Officer.....Basil Magor
District Supervisor.....W. G. Hudson

District No. 3, Baltimore, Md.
District Officer.....Sidney G. Jenks
District Supervisor.....G. F. Beckerley

District No. 4, Jacksonville, Fla.
(Acting) District Officer.....Thos. B. Slade
District Supervisor.....W. C. McGowan

District No. 5, New Orleans, La.
District Officer.....Lindsay H. Wallace
District Supervisor.....W. P. Nelson

District No. 6, Houston, Texas
District Supervisor.....Charles N. Crowell

District No. 7, San Francisco, Cal.
District Officer.....A. F. Pillsbury
District Supervisor.....T. L. Tomlinson

District No. 8, Seattle, Wash.
District Officer.....John F. Blain
District Supervisor.....William Pigott

District No. 9, Cleveland, O.
District Officer and Supervisor....Henry Penton

District No. 10, Philadelphia, Pa.
District Officer .....W. G. Coxe

District No. 11, Portland, Ore.
District Supervisor .....L. J. Wentworth

TRANSPORTATION DIVISION

Routing of shipments; tariffs, rates, claims, shipping bills; transportation statistical records; follow up on shipments and train records.

Manager.....F. C. Joubert
Special Assistant for Steel.....W. A. Sproull
Special Assistant for Passenger Transportation, C. F. Kirby
Routing.....F. K. Bidmean
Rates and Claims.....R. L. Kelley
Statistics.....T. C. Brown

Inland Traffic Section

Handles inland traffic and transportation of the United States Shipping Board, Emergency Fleet Corporation.

Manager, Inland Traffic.....D. L. Gray
Assistant, at Washington.....R. S. Golden
Assistant, at Philadelphia.....W. D. Harahan

PLANT PROTECTION SECTION

Plant guarding; plant fire protection and prevention; investigations and secret service.

Director.....Maj. Jas. A. Blair, Jr., N. A.
General Fire Marshal.....James McFall
Chief Guard Inspector.....Alvin Coffman

PRODUCTION DIVISION

Follows production on machinery and equipment purchased direct by the Emergency Fleet Corporation; on request, follows production of material ordered direct by shipbuilders.

Manager.....M. C. Tuttle
Asst. to Manager.....E. A. Benchley
Asst. to Manager.....L. Howland
Staff Specialists:
Boilers.....B. F. Safberg
Engines.....E. G. Rust
Anchors and Chains.....J. W. Maxey
Electrical Equipment.....E. W. McBrian
Steel.....M. F. Brown
Pumps and Condensers.....J. D. Moore
Valves and Pipes.....C. L. Bruff
Miscellaneous Equipment.....M. Becker

REQUIREMENTS SECTION

Analysis and review of requirements; for ships and ship material.

Executive Head.....George M. Brill

INDUSTRIAL RELATIONS GROUP

Functions as indicated in the sections below.

Director.....L. C. Marshall

Safety Engineering Section

Promoting safety engineering in plants.

Executive Head.....H. A. Schultz

Education and Training Section

Assistance and encouragement in the improvement of individual ability and skill; general and technical training.

Executive Head.....Louis E. Reber
Assistant.....J. Will Parry
Superintendent of Training.....E. E. McNary
Asst. Superintendent of Training..Chas. R. Allen

Health and Sanitation Section

Maintaining, improving and restoring the health of employees.

Director.....Lt.-Col. Phillip S. Doane
Medical Officer.....Dr. J. P. Sprague

Labor Section

Investigation of causes of employment and wage disputes.

Executive Head.....William Blackman

Industrial Service Section

Occupational draft deferments and transfers; information; employment management; shipyard volunteers; industrial safety.

Executive Head.....Meyer Bloomfield
Associate.....C. W. Doten
Secretary.....Raymond Booth
Director Shipyard Volunteers....Henry N. Morse
Asst. Director Shipyard Volunteers, Bruce M. Watson
Exemptions.....Wilfred Jessup

National Service Section

Information and stimulation in the ideals and responsibilities of American citizenship.

Executive Head.....Chas. A. Eaton
Business Secretary.....Horace L. Day
Secretary.....A. R. Parkhurst, Jr.

SHIPYARD PLANTS DIVISION.

Supervision of construction and maintenance of shipyard plants.

Manager.....Adm. H. H. Rousseau
Asst. Manager.....R. E. Bakenhus
Asst. to Manager.....J. Warren Jones
Asst. to Manager.....Lieut L. Ames Brown
Engineer .....F. T. Chambers

LEGAL DIVISION

Legal advisory service; preparation of contract forms; interpretation of contract provisions; prosecution of claims; settlement of claims.

General Counsel.....C. W. Cuthell
Assistant General Counsel.....Wm. H. White, Jr.
Assistant Counsel Housing.....Louis B. Wehle
Assistant Counsel Ship Cont's.Willard C. McNitt
Assistant Counsel Home Office.....Chas. S. Stern
Assistant Counsel Home Office.....C. M. Walton
Assistant Counsel Home Office....Chase Eastman
Assistant Counsel Home Office.....Monte Appel
Assistant Counsel Home Office.....C. D. Dorsey
Assistant Counsel Home Office....Edw. A. Bayles
Assistant Counsel Home Office..Arthur M. Marsh
Assistant Counsel Home Office.Alexander J. Field
Assistant Counsel Home Office..David Armstrong
Assistant Counsel Home Office.Rowland S. H. Dyer
Assistant Counsel Home Office....Edw. H. Updike
Assistant Counsel Agency Yards.....Mr. Gwinn
Assistant Counsel N. Y. Dist.Gerald S. O'Laughlin
Assistant Counsel Pacific Coast,.....Mr. Thacher

PERSONNEL SECTION

General personnel service; review of applications; placements.

Personnel Officer.....J. M. Goodell

GENERAL OFFICE

General clerical and stenographic service; mail and record service; equipment and office supplies; general office procedure.

Office Manager.....George E. Oller
Chief Clerk.....Laurence Leonard
Head of Personnel Records.....Miss E. K. Eckert
Head of Filing Section.....Chas. L. Luedtke
Head of Stenographic Section.....J. A. Sullivan
Head of Office Equipment, P. & S..Chas. E. Holmes
Head of Mailing Section.....Thos. A. McNamara
Head of Library and Maps.....Harry W. Kidder

AUDITING DIVISION

Auditing; general accounting.

General Auditor.....Gordan Wilson

Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

On the Coasts, Lakes and Rivers

What's Doing and Who's Doing It

Bad Weather Causes Lake Accidents

By M. L. Shaner

THE steamer CREAM CITY and the barge HOLLAND ran ashore Tuesday night, July 2. Both are near False Detour passage. The tug IOWA, with pumps and a diver, were sent down from the Soo to their assistance. Upon examination it was decided that both vessels are probably total losses. A large rock was found sticking up through the CREAM CITY's bottom and here decks are heaved up. The HOLLAND lies a short distance from her with water in her to the lake level. They both have been abandoned.

* * *

The steamer SENECA, bound for an Atlantic port with 3050 tons of coal, ran aground in a heavy fog, July 2. She was leaking seriously forward, but a wrecking tug sent to her aid was expected to get her off safely. The SENECA was formerly a lake vessel. She was recently converted into a cargo carrier and was on her first trip on the coast when the accident happened. She was built in Cleveland in 1899, and before she was converted for government use sailed between Buffalo and Duluth as a package freighter. She was at that time owned by the Lehigh Valley Transit Co. Her gross tonnage is listed as 2669.

* * *

Thick weather has resulted in a number of accidents. The steamer JAMES LAUGHLIN hit a rock in Ashtabula harbor, July 3, and had to be docked for repairs.

* * *

The AGNES W., which was formerly the R. P. FLOWER, went ashore at Drummond island, about 10 miles east of Detour, at 3:30 a. m., July 3. She was bound for Fort William without cargo to load grain. The steamer is on rocky bottom and is full of water according to reports received by agents and underwriters. She will probably be a total loss. The AGNES W is insured in companies represented by Wilcox, Peck & Hughes, and was operated by D. W. Stocking, Duluth. She was built in 1887 and her capacity is 2400 tons.

* * *

The steamer BELGIUM of the Great Lakes Steamship Co. is carrying on her side a sign 160 feet long and 6 feet deep which reads, "Buy War Savings Stamps." The members of the crew are advertising as well as buying.

* * *

The barge CHIEFTAIN, in tow of the steamer ORINOCO, broke away in high seas near Round island and drifted ashore. Tugs which tried to assist her were forced to wait until the weather had moderated. She was finally released, and passed on down to the Soo on July 2.

* * *

The steamer G. L. EATON, reported sunk in European waters, was formerly owned by the George Hall Coal & Transportation Co., Ogdensburg, N. Y.

* * *

The Sandusky & Islands Steamboat Co. are negotiating for dockage at Toledo for the freight and passenger steamer ARROW of Sandusky. If this can be secured the ARROW will be operated between Sandusky, the Lake Erie island ports and Toledo. At present she makes two round trips a day between Sandusky, Kelleys Island and Put-In-Bay.

* * *

The steamer HURON, carrying passengers and freight, left Toledo at 6 o'clock on the evening of July 5, on her maiden trip to Cleveland. The HURON will use the Eleventh street docks in Cleveland. This is the first regular passenger boat between the two points in years. It is planned to make daily trips between the two cities.

* * *

Three more steamers went ashore on July 5. The steel steamer SAMUEL MITCHELL ran ashore at Thunder Bay island and tugs were unable to release her. As she was pretty well up on the rocks it was thought that it might be necessary to use jacks to float her. The steamer SIMLA ran ashore at Farran's Point, St. Lawrence river, and the steamer ARABIAN stranded at Morrisburg in the St. Lawrence. Wreckers were sent to the boats from Kingston by the underwriters.

* * *

Claims Swanson, of Glencoe, Alta., a sailor on the dredge MAUMEE, was drowned in the harbor at Lorain, July 5. He stumbled and fell overboard and, being injured in the fall, was unable to help himself.

* * *

The steamer VAN HISE of the Pittsburgh Steamship Co., has been commandeered by the United States shipping board. She was taken over June 25 at Lorain after she delivered her ore cargo. She was taken to Buffalo where the work of stripping her of her spars and machinery was begun at a Buffalo shipyard preparatory to cutting her in two. The steamer will be raised 4 feet and reconstructed for salt water service.

* * *

The steamer ARGUS hit a rock in the harbor at Sandusky on June 20. An air compressor was put on board and the steamer delivered her coal cargo at Buffalo where she docked for repairs. She had damaged five plates, four of which had to be replaced.

* * *

Capt. C. H. Westcott, supervising inspector of steam vessels for the Detroit district, died June 26 at Harper hospital, Detroit. The funeral took place the following Sunday at St. Clair, Mich., where the body was taken for burial. President Livingstone of the Lake Carriers' association ordered all boats of the association to carry their flags at half mast while passing that point Sunday afternoon.

* * *

The steamer GLENISLA, while going into the Carnegie coal dock at Superior, ran into the corner of the concrete dock and dented one plate badly.

* * *

The steamer AUSTRALIA was sunk in collision with the steamer B. F. JONES at 12:20 on the afternoon of June 15. The accident occurred in the St. Clair river abreast of the oil refinery at Sarnia. The AUSTRALIA was pretty badly damaged forward, but all the members of the crew got off before she settled in about 25 feet of water. The JONES' bow was smashed in and both her hawse pipes were broken. Her forepeak was leaking but the pumps took care of the water in good shape. She left for Ashtabula under her own steam the morning after the accident. Her cargo consisted of ore. The AUSTRALIA, which loaded at Huron, was bound for Fort William with coal. Her cargo was sold by the underwriters to the Northwestern Steamship Co., of Port Huron, and will be delivered at that port. Two excellent views of the damaged vessel appear on page 347.

* * *

Capt. W. W. Eger, master of the steamer JOSEPH WOOD of the Hanna fleet, left for Philadelphia, June 28, to start work with the United States shipping board. He has been given a leave of absence for the remainder of the season. In his new position he will have charge of the construction of concrete ships. Capt. W. R. Jerome of the steamer M. C. ELPHICKE, will take the WOOD, and Capt Fred C. Sturtevant of the barge ALEX MAITLAND, will sail the ELPHICKE. Fred Des Jardnes, a mate in the line, was promoted and made master of the barge MAITLAND.

* * *

Steamer No. 734, building for the Emergency Fleet corporation, was launched at the Lorain yard of the American Shipbuilding Co. on the morning of June 25. The new boat which is full Welland canal size will be ready

Generated on 2024-07-26 17:27 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

to leave for the coast about a month from the date of launching.

* * *

The Standard Oil tanker WILLIAM P. COWAN left Lorain, June 20, on her maiden voyage to the upper lakes. She is in command of Capt. C. D. Brown. The vessel was built at Lorain at a cost of $1,000,000.

* * *

The Superior yard of the American Shipbuilding Co. launched steamer No. 534 on June 22. The new boat will be completed and ready for business about 30 days after launching. This steamer also is building for the Emergency Fleet corporation.

* * *

The steamers E. N. BREITUNG and C. G. BREITUNG were purchased by the Morrow Steamship Co., of Buffalo, from the Juliet Graveraet Steamship Co., on June 20. The price was not given out. The ore freight contracts for the boats, which run for a number of years, will be carried out by the new owners. The E. N. BREITUNG, formerly the J. W. MOORE, was built at Toledo in 1890. She is 246 feet keel, 41 feet beam and 24½ feet deep. The steamer C. G. BREITUNG was built in Cleveland in 1895 and was formerly the YALE. She is 371 feet keel, 45 feet beam and 27 feet deep.

Up and Down the Pacific Coast

ICE conditions in Bering sea are unusually severe for so late in the season. The first vessels have just arrived at Nome, one of them having been icebound two weeks and the other 10 days. Reports from Bristol bay indicate that the fleet of icebound cannery ships has at last been released. One was lost, and several seriously damaged.

* * *

Seattle is the logical gateway for the dispatch of troops and supplies to Siberia and Russia and it is expected that if the government decides to intervene in the former dominions of the czar, Seattle will become the port of embarkation. Thousands of tons of locomotives, cars and other railroad supplies are still in storage there awaiting shipment to Siberia. This material was booked for Vladivostok but shipment was cancelled until conditions in Russia become normal. With the large number of steel ships being completed on this coast, the government could promptly assemble a large fleet of transports, colliers and cargo carriers.

* * *

Due to the perils of the Suez route, passenger travel across the Pacific has been exceptionally heavy for months and all accommodations are at a premium, being taken usually for a month in advance. It is understood that some of the Canadian Pacific liners have withdrawn, which adds to the scarcity of berths. Reports from the Orient state that Japanese ports are badly congested with freight, due to the scarcity of vessels. A recent estimate showed an accumulation of 460,000 tons of cargo for export at Japanese ports.

* * *

Longshoremen in British Columbia have signed a six months' working agreement with their employers, which involves a considerable increase in wages and places them on a par with Puget sound. The general scale provides for 80 cents per hour straight time and $1.25 overtime for working on deep-sea ships. On specific cargoes, the scale is: Lumber, 85c and $1.22½; coal, 85c and $1.22½; trimming bulk grain, 90c and $1.25. For dock trucking, 65c and $1 is to be paid. For foreign coastwise steamships the rate is 75c and $1 and for coastwise vessels 65c and 90c.

* * *

Fire of unknown origin destroyed the wooden steamship RAVALLI, of the Pacific Steamship Co., while the vessel was en route from Seattle to southeastern Alaskan ports, June 14. The cargo consisting of coal and cannery supplies was a total loss. The RAVALLI was beached at Lowe Inlet, B. C., where she burned to the water's edge, entailing a loss of approximately $450,000. The vessel carried about 80 passengers but none was lost or injured.

* * *

The steel steamships CHIPPEWA and IROQUOIS, products of Great Lakes yards and brought to Puget sound about 10 years ago, are again to enter active service. They have been chartered for use as training ships by the sea training service of the United States shipping board. These vessels are owned by the Puget Sound Navigation Co. and have been used on various Puget sound routes and as excursoin ships. They are now being altered and provided with accommodations for a large number of apprentices, who will make short sea trips in them. The CHIPPEWA and IROQUOIS are regarded as ideal vessels for this work. They will operate out of West Seattle where a large training station for apprentices is being erected.

* * *

With eight chartered wooden auxiliary ships, which will later be replaced by steel freighters, the American Liberty Steamship line is planning to begin a regular freight service between Puget sound, Manila and the East Indies. There is an insistent demand for space between north Pacific ports and Straits settlements and the new line expects to build up a regular trade.

* * *

What is regarded as a novel feat was recently completed upon the arrival of the 3500-ton drydock OREGON at Seattle, after being towed from Portland, Oreg., a distance of 370 miles. The big dock was formerly operated at Portland by the Oregon Drydock Co., but it was purchased by J. T. Heffernan, Seattle, who is establishing a repair and drydock plant at West Seattle. The dock was towed by the tugs RICHARD HOLYOKE and TYEE. The distance from Portland to the sea is 110 miles, from Astoria to Cape Flattery 135 miles and from Cape Flattery to Seattle 125 miles. Excellent weather prevailed while the dock was on the open Pacific. Four days were required to tow from Astoria to Seattle.

* * *

Increase of her foreign trade has induced Seattle to duplicate two of the large public terminals, provided the voters grant the necessary funds. The estimated cost of these improvements is $2,441,000. The tentative plans contemplate the erection of a duplicate of the Smith cove terminal, the largest on the Pacific coast, as well as a duplicate of the Hanford street wharf, one of the most successful of the public terminals.

* * *

The old wooden steamship ROSALIE, famous during the Klondike rush as one of the large fleet operating out of Seattle, has been destroyed by fire. While the hull is beyond repair, the engines and machinery can be salved.

* * *

The wooden steamship JOHN KIERNAN, built by the Kiernan & Kern Shipbuilding Co., Portland, Oreg., has been sold to French interests but will remain under the American flag. This vessel is listed as a carrier of 2750 tons. Her engines were built at Toledo, O.

* * *

The largest sawmill on the north Pacific is to be erected on the Olympic peninsula, below Port Angeles, Wash. It will have a daily capacity of 1,250,000 feet. Extreme speed will be shown in its construction in order to complete within a year a contract for furnishing the government 300,000,000 feet of airplane spruce. The contract has been signed by Siems-Carey-H. S. Kerbaugh, a new corporation, the members of which have heretofore figured in large railroad contracts. Forty miles of road will be built from the terminus of the Chicago, Milwaukee & St. Paul railroad in order to reach the vast stands of spruce in which the new mill will be located.

* * *

Four historic wooden tugs, the RICHARD HOLYOKE, PROSPER, TYEE and WANDERER, have been purchased by the Skinner & Eddy Corp. from the Puget Sound Tug Boat Co. Capt. C. T. Bailey, better known as "Buck", a veteran Puget sound pilot and tug boat master, has been appointed superintendent. The growth of the Skinner & Eddy Corp. has been so rapid that the need of a fleet of tugs has been apparent for some time. The tugs will be used in assisting at launchings, in towing material to the shipbuilding yard and also at the plant of the Port Blakely Mill Co. The Puget Sound Tug Boat Co. retains the PIONEER and WYADDA. It also owns the steel tug GOLIAH, at present commandeered by the government.

* * *

Incorporation of the Todd Drydocks, Inc., with a capitalization of $1,000,000 has just been completed. This company is the successor to the Seattle Con-

Generated on 2024-07-26 17:27 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

struction & Dry Dock Co. and it has acquired a site on Harbor island, Seattle, where its docks and repair plant will be located. Preliminary work is well under way and the plant will be in full operation within two months. The incorporators are H. W. Kent, Judge W. H. Bogle and F. T. Merritt. Mr. Kent was vice president and treasurer of the old company. The Seattle Construction & Dry Dock Co. has just turned over to the China Mail Steamship Co. the rebuilt steamship CONGRESS, hereafter to be known as the NANKING. This was the largest repair job ever done on the Pacific. The CONGRESS was damaged by fire at sea, in September, 1916, and the repair work has taken a year. It is understood that the NANKING represents an investment of more than $2,000,000. She will operate between San Francisco and Oriental ports.

* * *

The concrete steamship FAITH has been chartered to load lumber at Puget sound ports for Chile and will leave shortly with about 1,600,000 feet.

* * *

The EASTERN SUN is the new name of the first new steel steamship purchased by the United States from Japan. The EASTERN SUN, a modern carrier of 9000 tons, arrived at Seattle as DAIFUKU No. 20, but was renamed when the Stars and Stripes were raised over her taffrail.

Along the Atlantic and Gulf Coasts

CAPT. SAMUEL VEAZIE, master of a 4-mast schooner hailing from Boston, is 72 years old and has been a seafarer nearly 60 years. Recently the veteran was believed to have fallen victim to a submarine as the vessel, bound from Moss Point, Miss., for Boston, with cargo of railroad ties, was considerably overdue. Captain Veazie declares he feels as young as ever and will continue at sea at least another 10 years.

* * *

Five-mast schooner JEROME JONES, built at Bath, Me., in 1916, has been renamed FRANK DEERING.

* * *

Two-mast schooner NEVIS, built at Noel, N. S., in 1903, has been sold by C. H. Hines, Maitland, to W. H. Greenland, St. John, N. F., and will be used to transport fish between Newfoundland and Cadiz.

* * *

New steamer LIBERTY has been towed to Boston from South Portland, Me., and will have machinery installed by Bertlesen & Petersen at the former port.

* * *

Two Argentine transports, chartered to transport freight at $50 per ton from Buenos Aires to Boston, recently arrived. The transports, between them, earned $513,000 on the charter. They loaded coal at a Virginia port for home.

* * *

Capt. John Sjolund of Norwegian steamship ELISABETH has resigned to accept position of manager of a Boston ship chandlery. The ship has been laid up several months.

* * *

Recently, a cargo of coal was loaded at Boston for Buenos Aires, the first time in history. A Norwegian bark was allowed the shipment by special permission of the United States shipping board.

* * *

American steamship LAKE HOUGHTON, built at Detroit this year, is a total loss on Cranberry isle, N. S., having stranded while bound from Sydney, C. B., for Boston. Several lake craft recently brought to the coast have had trouble and are at repair yards.

* * *

Spanish steamship MAR ROJO, Huelva for New York, picked up with loss of propeller and tail shaft by Capt. H. L. McKay of a United Fruit Co.'s ship and towed to Boston, is worth while as salvage, being valued at about $1,000,000 although in ballast trim at the time. MAR ROJO must wait about two months for a new shaft and wheel. She is laid up at Boston.

* * *

Capt. C. H. Swimm of tug NELLIE has been given command of new tug PRISCILLA built at Thomaston, Me., for Doane Towboat Co., Boston.

* * *

Capt. W. H. Davis of 5-mast schooner JACOB M. HASKELL, recently torpedoed off the New Jersey coast and landed at Vineyard Haven by steamer GRECIAN, voyaged from that port to Boston in his power yawl via the Cape Cod canal, making the trip because he believed important harbors would be closed to large vessels on account of submarine menace.

* * *

Statistics for the port of Boston show that more vessels from foreign ports arrived in June compared with the corresponding period last year.

* * *

Southern ports will get six of the 10 new dry docks to be built by the shipping board with the $25,000,000 added to the sundry civil appropriation bill by the senate appropriations committee. The ports to get these dry docks, according to dispatches from Washington to shipping men on the Gulf coast, are Savannah, Ga., Jacksonville, Fla., Beaumont and Galveston, Tex., and New Orleans.

* * *

A service flag with 46 stars now floats over the Sunset docks of the Southern Pacific Co., New Orleans, having been raised with semi-military ceremonies.

* * *

Increase of 25 per cent in the fees of Mississippi river bar pilots is allowed in a bill passed at a recent session of the state legislature.

* * *

A light ship for the south pass, at the mouth of the Mississippi river and a lighthouse depot at New Orleans are authorized in the aids to navigation bill passed by the house of representatives recently. The lightship will cost $160,000 and the depot $88,500. The depot is to be established on the grounds of the marine hospital.

* * *

Plantation owners and farmers between Baton Rouge, La., and New Orleans have formed a company to purchase a river steamer and operate it between the two cities for their own benefit. Capt. C. J. Blanchard, New Orleans, has been put in charge of the project, from the purchase of the boat to its operation. An option has been obtained on a small steamer, at a price of $25,000, and $25,000 more has been subscribed for cost of operation until the steamboat pays for its own running costs. The plan is the result of the withdrawal of all the river steamers from the Baton Rouge-New Orleans trade, owing to increasing costs of operation.

* * *

Alleged failure of the schooner GEORGE KILKEY to deliver cargoes of rice and lubricating oil in France has resulted in a $65,000 libel suit being filed against the schooner's owner, the G. M. Conrad Co., in United States district court in New Orleans. A. and P. Crespel and Edmond Levy, of Paris, and the Scofield Oil Co., New York, are the plaintiffs.

* * *

Schooner ROSEWAY, with 200,000 feet of lumber on board from Port Arthur, Tex., for West Indian ports, sprung a bad leak 150 miles off Sabine jetties and was forced to return to her home port in tow for repairs.

* * *

Work is under way on the large timber-assembling plant being built for the Emergency Fleet corporation at Beaumont, Tex. Nearly 50 acres of land has been given by the city for the free use of the government. Sheds for the storing of millions of feet of lumber are being erected, and, instead of being shipped direct to the shipyards, timber and lumber for all the government-built vessels in the sixth district will be sent to Beaumont and thence distributed according to the needs of each yard. This will eliminate accumulation of surplus stock in shipyards and will enable shipbuilders to obtain, without delay, all materials they may need. Machinery to equip vessels for the sea also will be assembled there.

* * *

The steamer COLONEL BOWIE started on her maiden voyage as a deep-sea freighter recently, date and destination held secret. The vessel was built by the Clooney Construction Co., West Lake, La., for the Gulf Export & Transportation Co.

* * *

The shallow pass between Lake Pontchartrain and the Gulf of Mexico has been dredged by the government, affording an open outlet to the sea to ships now being built at Slidell, Madisonville and other points along the lake shore.

Generated on 2024-07-26 17:27 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Equipment Used Afloat and Ashore

Reduction Gear—Drift Bolt Driver—Lock Nut—Air and Water Separator—Hand and Arm Protectors—Electric Hammer—Tower Whirlers

IN connecting marine auxiliary apparatus to the driving unit some form of speed transforming equipment is necessary. This is due to the fact that the driving turbine, engine or motor for efficient operation requires a greater or less speed than the most efficient speed of the driven unit.

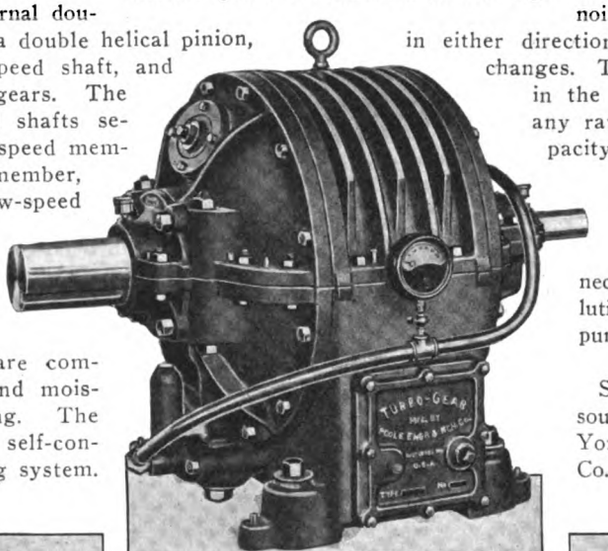
A reduction gear which was designed for this purpose is shown in the accompanying illustrations, and is manufactured by the Poole Engineering & Machine Co., Baltimore.

The gear consists of an internal double helical herringbone gear, a double helical pinion, cut integral with the high-speed shaft, and intermediate double helical gears. The latter are mounted on steel shafts secured to the cast steel, slow-speed member. On this slow-speed member, which is part of the slow-speed shaft, are mounted two heavy-duty ball bearings, one on each side of the gears and supported directly by the substantial casing. The entire gear members are completely enclosed in a dust and moisture proof cast iron casing. The gears are lubricated by a self-contained, forced-feed, lubricating system.

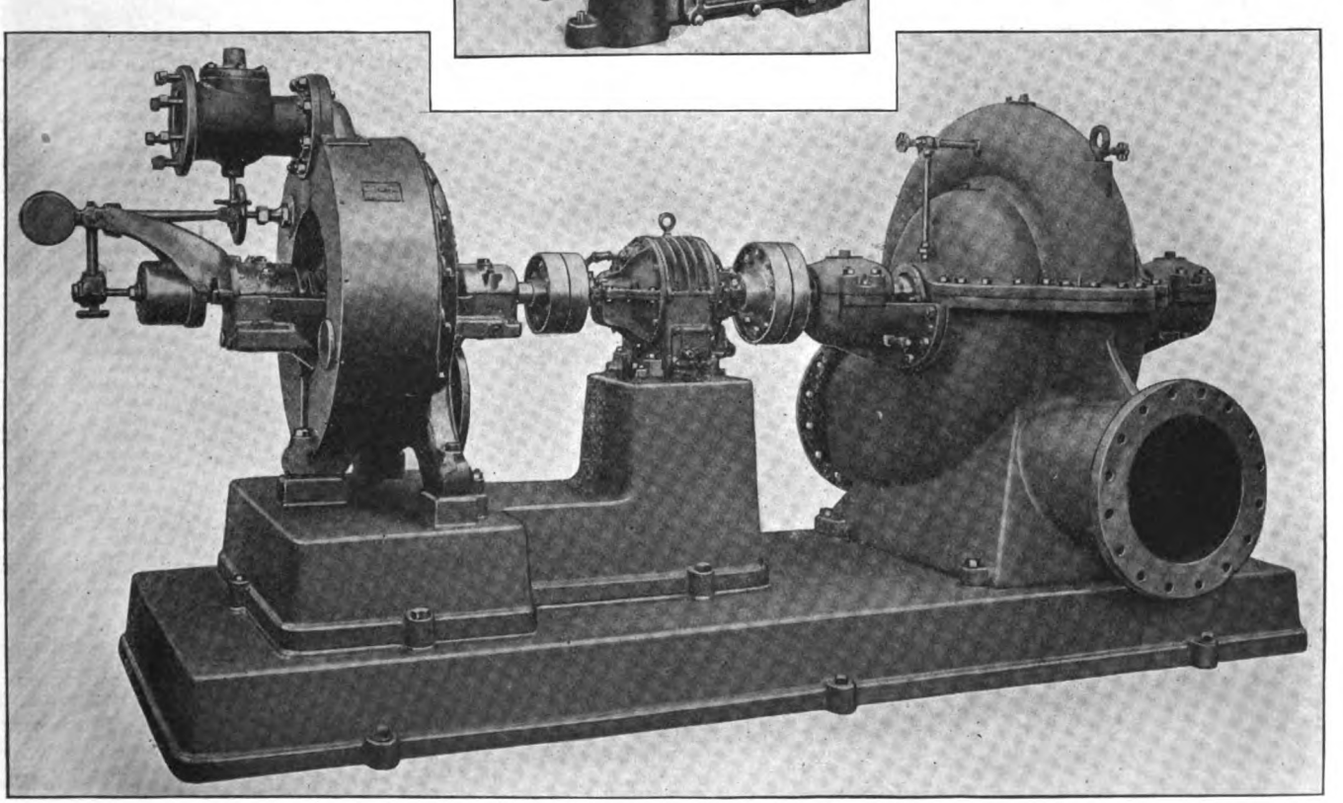
The gear operates in the following manner: Let it be assumed that it is desired to drive a pump with a high-speed turbine. The turbine should be connected to the pinion shaft (small diameter shaft) of the gear. This causes the pinion shaft to rotate and turn the intermediate gears. As the internal gear is held stationary, the intermediate gears must not only rotate but of necessity revolve about the center of the pinion shaft as a center. The intermediate gears are mounted in the cage or low speed member which consequently must rotate as the intermediate gears revolve. In this manner the speed transformation is accomplished. The pump is connected to the large-diameter, slow-speed shaft.

All shafts and gear members are supported on each side, which insures permanent alignment. Both high and low-speed shafts are in the same line, this construction eliminating any side pull or strain on the bearings.

The device is said to operate without noise or vibration, and it will drive in either direction of rotation without making any changes. The high and low-speed shafts rotate in the same direction. It is designed in any ratio from 4 to 1 up and in any capacity from 1 to 20,000 horsepower. The lower illustration shows a practical application of the device to a marine drive. In this case an 85-horsepower gear, direct connected to a turbine running at 3000 revolutions per minute, drives a centrifugal pump at 870 revolutions per minute.

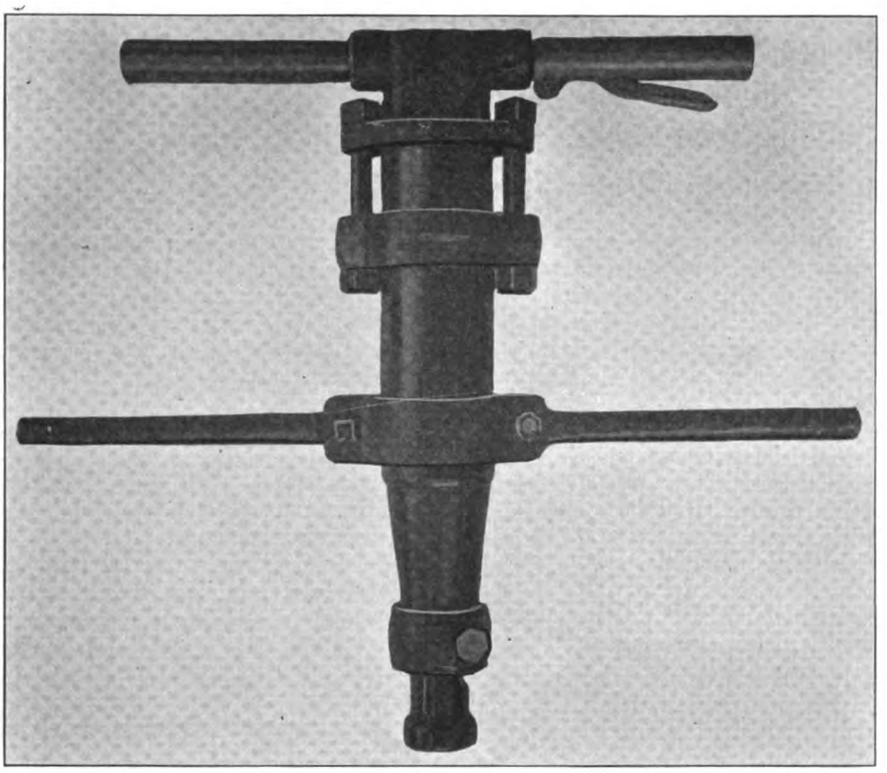


Stuart Root, representative in the south for the Central Foundry Co., New York, has opened an office in the Trust Co. of Georgia building, Atlanta, Ga.,



REDUCTION GEAR AND ITS APPLICATION BETWEEN A MARINE CENTRIFUGAL PUMP AND A STEAM TURBINE

Generated on 2024-07-26 17:27 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN



DRIFT BOLT DRIVER FOR SHIPYARDS

which he will use as headquarters. Mr. Root handles the marine castings business of the Central Foundry Co.

Centrifugal Pumps

A pamphlet is being circulated by the De Laval Steam Turbine Co., Trenton, N. J., illustrating and describing a combined steam turbine and centrifugal boiler feed pump. On this machine the steam turbine rotor and the pump impellers are mounted upon the same shaft and are enclosed in the same housing. The pumps are made in capacities from 2000 to 10,000 boiler horsepower.

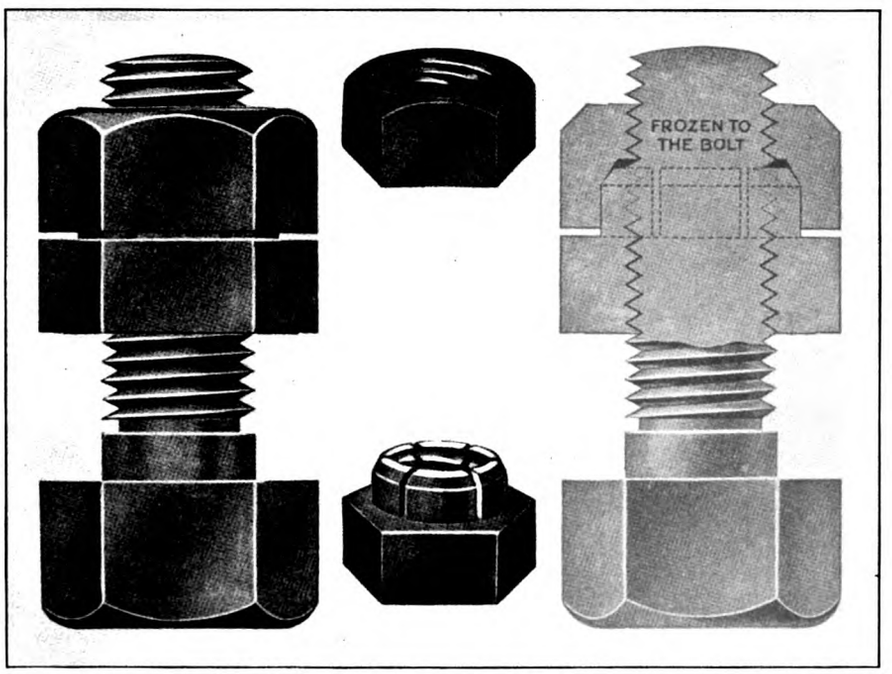
Drift Bolt Driver

The drift bolt driver shown in the accompanying illustration has been developed by the Denver Rock Drill Mfg. Co., Denver and New York.

The machine is 22 inches overall, weighs 68 pounds and can be handled by two men. It is so arranged that the lower handles can be placed in the same plane as the upper ones for driving horizontal bolts in narrow places, or across the upper handles for up or down bolts.

While the hammer is powerful enough to drive the largest drifts in wooden ships rapidly, its comparatively slight recoil allows it to be used on the staging around the ship, and for up bolts and treenails on the bottom or sides of the vessel.

Different snaps for the large drifts, treenails, and headed bolts are provided. A trigger in the handle controls the inlet of air at the will of the operator. When desired, it can be fitted with an air feed for driving horizontal bolts or those pointing up.



TWO-MEMBER LOCK NUTS FOR MARINE WORK

Lock Nut of New Type

While many kinds of lock nuts have been brought out from time to time, none has embodied principles similar to the device shown in the accompanying illustration. This check nut is a product of the Drake Lock Nut Co. of Ohio, Cleveland.

As the illustration clearly shows, the device consists of two sections, a lower member which seats itself firmly on the casting or other part through which the bolt or stud projects and a supplementary nut which is screwed down to meet the lower member.

The lower member is provided with a pilot that fits a counterbored depression in the lock nut. This pilot has at its top a 25-degree angle which, in operation, engages an angle of the same degree at the base of the countersunk depression in the upper member. The pilot is slotted in four places. Thus, after the lower nut is firmly seated, the action of the upper nut compresses the pilot, causing it to freeze firmly to the threads of the bolt. By referring to the sectional view, it is seen that the device is so constructed that there is ample space between the two members after the upper nut has been screwed home. This principle applies to the space between the top of the pilot and the root of the countersinking as well as to the space between the hexagon nuts.

Owing to the fact that the movement of the slotted member is not circumferential, no wear is brought on the threads as the device is locked. Thus, the nuts are designed to be used a number of times without injury to the bolt threads.

It is said that these nuts have given satisfaction under the most exacting requirements, among them being an installation on 3-inch piston air drills as used in shipyards. An interesting test was also made in marine engine-room service. In this case double 1-inch nuts were used but, owing to the excessive vibration, they had to be watched carefully and tightened daily. The lock nut under discussion was installed and is

Generated on 2024-07-26 17:27 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

said to have remained tight after months of continuous service. These nuts have also been employed on steam hammers used for forging marine work.

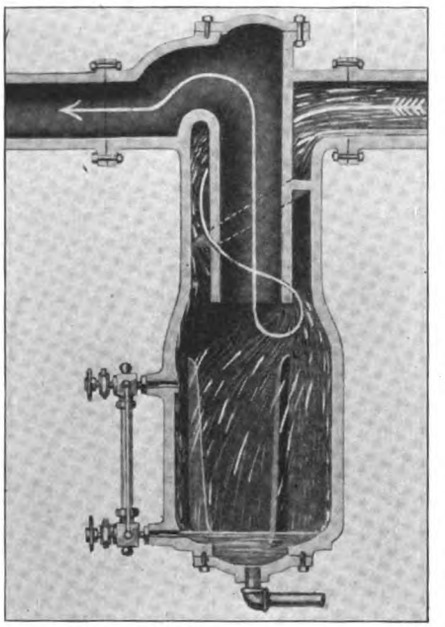
It is pointed out that the nut locks the dead member in any position desired. Thus it can be used to accommodate oscillating or pulsating movements. The lower member has an abundance of threads which gives it ample load carrying capacity and the nuts can be matched in locking the device to give a finished appearance to the installation.

The nuts are made in standard sizes ranging from ⅜-inch to 2 inches.

Air and Water Separator

A device for removing the water from compressed air used with pneumatic tools has been developed by the Griscom-Russell Co., New York. Water in compressed air is detrimental to the efficiency of any air tool and particularly in the case of a riveting hammer. This water occupies valuable power space in the cylinder of the tool, reducing its driving force and also tending to cause damage to the tool itself. A dry compressed air supply will assist in increasing the number of rivets per hammer.

This air separator, as it is termed, is designed mechanically to remove the water from compressed air. Centrifugal force is utilized as the means of separating the water from the air. As shown in the accompanying illustration, when the air and water enter the separator they are caused to pass through a helical path formed about a central cylinder, resulting in a swirling motion. The water is thrown out of the curving air current against the wall of the separator, which it meets at an angle, without the slightest splatter or splash and slips smoothly along until it reaches the receiver space at the bottom. The air passes on its way out of the separator free from moisture.

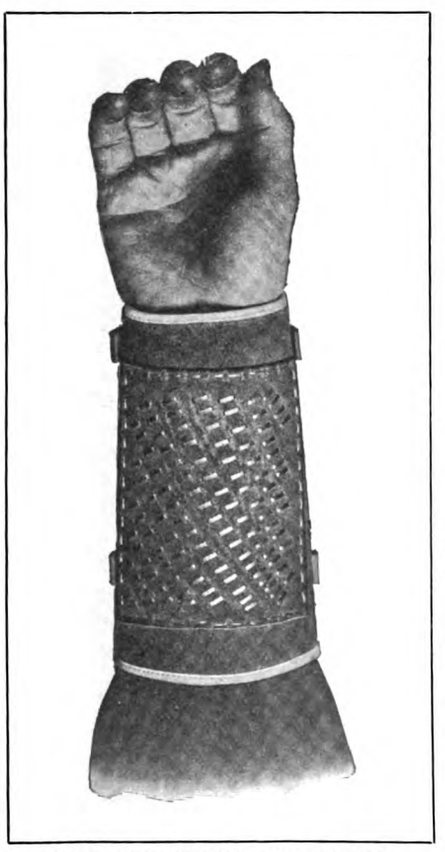


DEVICE FOR REMOVING MOISTURE FROM COMPRESSED AIR

Hand and Arm Protectors

Those who work in shipyards, or in machine shops, foundries and other plants engaged in marine work, face constantly the possibility of getting cuts, abrasions and burns on the hands and arms from contact with the ragged edges of steel plates, hot metal, rough-dressed lumber, castings, semifinished machine parts, etc.

To provide means for preventing such accidents, the Hickory Steel-Grip Glove Co., Chicago, has developed a number of gloves, mittens and arm protectors. These are made of chrome-tanned leather interwoven with strip steel. A glove and an arm protector of this description are shown in the accompanying illustration. It is said that the arm protectors are especially adapted for those who daily handle steel sheets. All the company's products are sewed with steel thread to prevent ripping.



ARM AND WRIST PROTECTOR

A catalog recently issued by the Bastian-Blessing Co., Chicago, is devoted to the company's line of welding and cutting apparatus, lead burning equipment and regulators. The company has had experience for a number of years in the construction of oxygen, acetylene and hydrogen regulators and in torch construction. It has now developed a line of welding and cutting torches. The catalog is thoroughly illustrated and describes in detail the various types of equipment.

Electric Hammer

The Electric Hammer Co., Seattle, has developed an electrically operated hammer for use in shipyards for riveting, chipping and caulking. The company was organized by George L. Kollock and Robert P. Martin, inventors of the tool.

The tool is easily moved about and it is designed to be economical in operation. The electric hammer can be equipped with either a hammer, chipping chisel or caulking iron, which makes it a practicable tool for wood as well as steel shipbuilding yards. In appearance, the electric hammer resembles a pneumatic hammer. The only auxiliaries required for its operation are several feet of electric wire and a lamp socket fitted for 110 volts. The tool weighs 8 pounds.

The tool is said to be economical in operation. According to the inventors, tests in Seattle yards showed the cost of power used for chipping was 3⅜ cents a day and for riveting, using full stock standard rivets, 14 cents in an 8-hour day. This estimate is based on current at 3 cents per kilowatt.

GLOVE FOR SHIPWORKERS

Generated on 2024-07-26 17:27 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The electric hammer is said to be adapted for use at high or low speed as the operator desires, and in wooden shipyards the tool is said to show equal efficiency in caulking and reefing. Steel vessels carrying the tool can do repair work above the water line by connecting with the lighting circuit.

Tower Whirlers

Tower whirlers now are being used in a number of steel and wood shipyards. The name applies to a new type of hoisting traveler and is derived from the ability of this machine to swing a load rapidly through 360 degrees.

The illustrations show tower whirlers in one of the large Delaware river yards. One eastern yard has five of these machines in operation serving four ways. They are so arranged that, when necessary, two whirlers can work simultaneously on any of the ships, the two on the extreme ends serving the outside ways and the material yards.

Each tower whirler consists of a timber tower 32 feet in height, mounted on four 28-inch wheels, and capable of traveling along a 16-foot gage track at the rate of 300 feet per minute. On the tower is a whirler carrying a 55-foot boom, which can rotate through 360 degrees in approximately 30 seconds. Several advantages are gained by mounting the whirlers on movable towers. Only enough track is built to hold the tower, and it is this that is made movable. The machine is so elevated that the operator is able to watch his load at all times. The location of the operator is particularly good when his load is within the hull, for he can watch every move made.

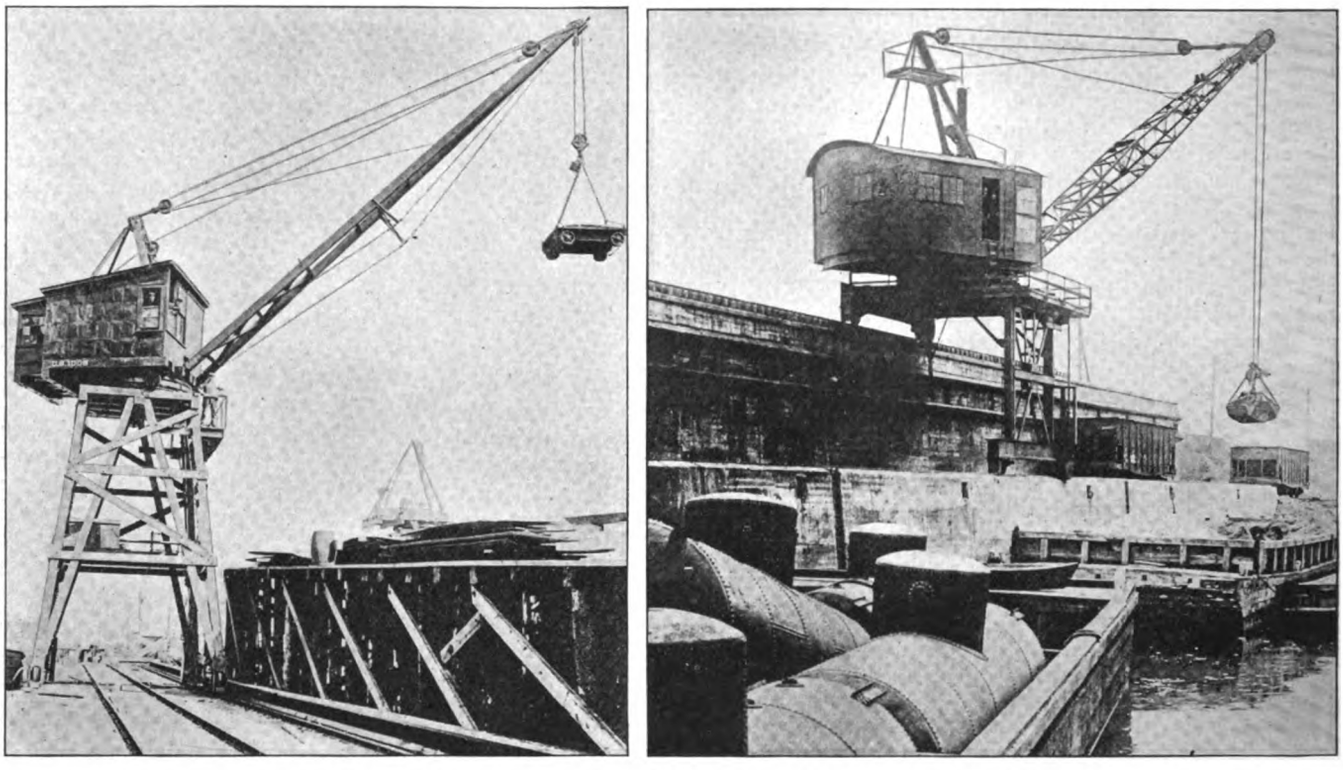
The towers are so constructed that a gondola car can be run on a standard gage railroad track between the whirler tower track rails, making it possible to unload material directly from the cars and place it either on the ship or in the material storage yard. Some yards are built with an additional track parallel to the ways. On this track a whirler serves the material storage yard, placing material as needed on flat cars which are pushed under the various whirlers serving ways. These unload from the flat cars and place the material directly on the shipways.

Tower whirlers also are being used to fit out the ships after they take the water, as their working radius enables them to span the beam while the ships are lying at the dock.

The construction of the boom and whirler is such that it can lift its full load at a distance of 53 feet from the center line of the track, and on either side. With a 2-part line, the 5-ton load is raised at the rate of 150 feet per minute; a 2-ton load can be raised at the rate of 200 feet per minute. Power for the operation of the whirlers is, in one instance, furnished by three General Electric motors at 230 volts, direct current. The hoisting motor is 65 horsepower, a 20 horsepower motor is used for swinging, and another 20 horsepower motor for traveling. The hoisting and swinging motors are located on the whirler platform and the traveling motor is on a deck part way up the tower, connected with the wheels by chains and sprockets. The controllers and brakes are conveniently located so that the operator does not have to take his eyes from the load to handle the movements of the whirler. Current is supplied by two angle iron rails, covered by a wood box to prevent accidents.

Not all whirlers are electrically operated. In many cases electricity is not available, so standard steam hoisting, swinging and traveling equipment is used. Steam-driven whirlers require the services of an operator and a fireman, while one man only is required for the electrically equipped machine.

The order for the five machines mentioned above was placed with the Dravo Engineering Works, Pittsburgh, Oct. 25, 1917. The first machine was loaded on two 46-foot gondola cars and was ready to ship from Pittsburgh Dec. 21. The entire order was completed and final shipment made by March 14, 1918.



TOWER WHIRLERS ARE BEING EMPLOYED IN BOTH STEEL AND WOOD SHIPYARDS

The Bolinders Co., New York City, has just issued an attractive 8-page pamphlet illustrating 32 typical American vessels of all classes in which the company's engines have been installed. A list of 82 vessels, giving the principal dimensions, deadweight tonnage, horsepower and speed is also included.

Generated on 2024-07-26 17:28 GMT / https://hdl.handle.net/2027/uiug.30112043868493
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN